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the OIL AND GAS JOURNAL

PUBLISHED WEEKLY JULY 27, 1959

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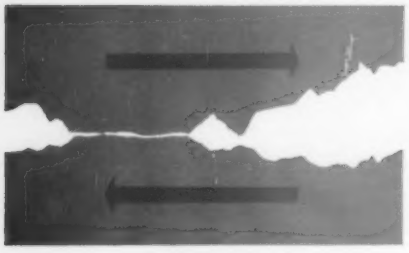
. . . an interview with Dr. A. I. Levorsen

WHY VALVE LUBRICATION SAVES MONEY

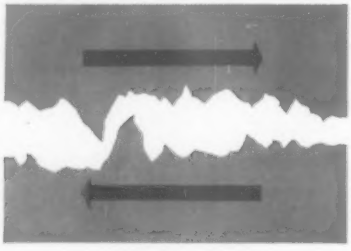
TROUBLE STARTS WHEN METAL RUBS METAL...

Under the microscope, metal that appears mirror-smooth to the naked eye shows as sharp mountains and deep valleys. This roughness, combined with the heat and pressure of metal-to-metal rubbing, causes valve trouble in the following ways:



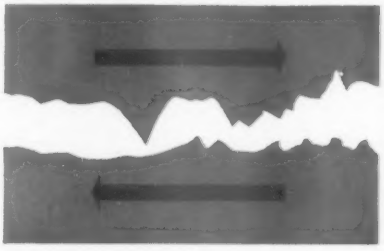
STICKING

"Cold Welding" occurs when friction or pressure welds the peaks together. The result: sticking.



SHEARING

The "hills" of one surface gouge into the hills of the other surface causing further sticking and scoring.

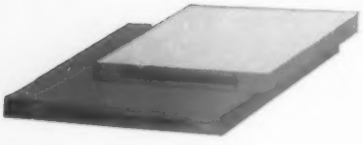


PLOWING

If one surface is even slightly harder than the other, the hard peaks act like a "plow". Leakage soon results.

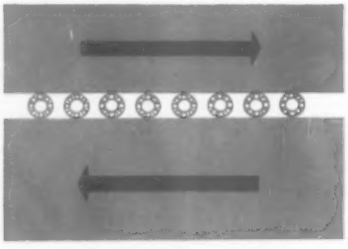
BUT, WITH ROCKWELL-NORDSTROM VALVE LUBRICATION...

metal-to-metal contact is eliminated. Here's what happens when metal-to-metal surfaces are lubricated:



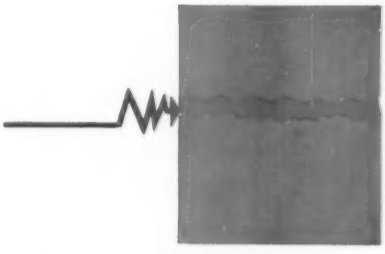
SLIDING

Lubricant prevents friction heat, eliminating danger of cold welding and assuring easy movement.



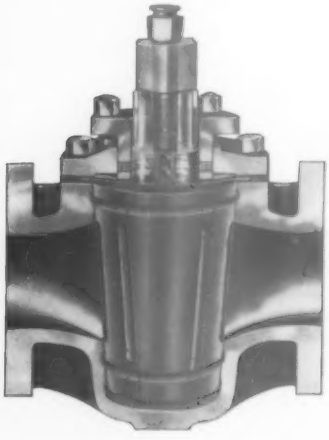
ROLLING

Lubricant becomes millions of tiny bearings . . . metal surfaces actually never come into contact with one another.



SEALING

Pressurized lubricant forms an impenetrable, continuous seal against leakage.



LONGER LIFE, LOWER COST, better valve service results when you specify Rockwell-Nordstrom lubricated plug valves. Notice in the drawing at the left how lubricant protects all the working surfaces and seals positively against leakage. Since lubricant eliminates adhesion, shearing and plowing, Rockwell-Nordstrom valves cost you less to use . . . year after year. Rockwell-Nordstrom valves are available in a complete range of sizes and pressure ratings to answer every flow control need. They cost no more to buy, often less, than ordinary valves. See your nearest supplier or write Rockwell Manufacturing Company, Pittsburgh 8, Pa. for complete details.

Canadian Valve Licensee: Peacock Brothers Limited

ROCKWELL-Nordstrom VALVES

it's **ROCKWELL**

MANUFACTURING COMPANY

OIL AND GAS JOURNAL
Vol. 57 No. 31

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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
July 27, 1959

Oil industry over all had a good first half:

Consider the box score:

...Drilling activity is increasing. Operators completed 24,367 wells first half, plan 26,595 or 13.2% more in last.

...Domestic demand gained 6.4% over same period last year, averaging 9,562,000 bbl. daily.

...Crude production averaged 7,180,100 bbl. daily, an increase of 11.1% over 1958.

...Refinery runs were 7.9% higher, setting a new first-half record of 8,036,000 bbl. daily.

Complaints: Production and runs too high, products imports too high, inventories excessive, and prices soft.

Full details in Mid-Year Report starting on p. 119.

▼ ▼ ▼

Marketing picture is bitter sweet.

Gasoline prices are firming up. Gulf Coast spot prices have moved up a full cent a gallon to average 11 cents in cargo lots. Midcontinent markets also are better with a general advance expected to be firmed up by first of August for a gain of about a half cent (p. 282).

East Texas crude prices are under pressure following 20-cent cut to $3.05 a barrel by Atlantic Refining. Others are expected to follow but move is termed an adjustment. It's not expected to result in chain-reaction cuts (p.97).

▼ ▼ ▼

Current strikes show signs of being long ones:

In steel, both union and management leaders appear to be digging in for a siege.

Steel users, including oil men, show no early rush to grab supplies. Many oil men anticipated the strike and built up inventories. Rush eventually will come as pinch for needed steel begins to be felt.

Foreign steel, meanwhile, is moving to American ports. Most of this already is sold. Orders for new foreign deliveries are running into delays of as much as 5 to 6 months and are facing prices as high or higher than U. S. tabs.

Agents of Japan's two biggest steel makers have set up offices in Houston in bid for oil-country tubular business.

Both report business now very quiet but declare they're in the oil country to stay.

In refinery strikes, loss of gasoline production is partial cause for current firmer motor-fuel prices.

This condition also could last a spell because the issue of plant manning and scheduling may be a tough one to solve.

One thing to watch: Fine public-relations job being done during strike by American Oil at Texas City. The plant manager has kept the public and employes informed on developments by letter, special bulletins, and fact sheets. In addition he's easily available to newsmen. Result: Management appears to be getting its story well publicized.

▼ ▼ ▼

Budget cuts will hit proposed atomic blast to produce shale oil.

House committee has trimmed $2 million from Atomic Energy Commission budget for "Operation Plowshare," leaving $6 million for possible shale program and other industrial uses of nuclear explosions.

Decision on priority of various plowshare experiments has not yet been made. Oil industry may get clearer picture of proposal at next meeting with Interior and AEC officials this fall.

One possibility: Industry may be asked to foot more of the bill.

▼ ▼ ▼

Gulf has formally announced details of its political program. Plans are much as discussed previously by company officials (OGJ, Sept. 15, p. 112 and April 27, p. 91).

Program is strictly long range with three major phases: Activity by employes at local and regional levels, national activity by registered lobbyist and a writer-public relations expert, and an information program using newsletters and present company publications.

Esso Standard, meanwhile, is joining the ranks of companies who, like Gulf, are taking more active roles in public affairs. Esso's aim is to keep employes informed on legislative trends—national, state, and local—in the hope of developing a more favorable climate for business.

Arizona now has an oil and gas commission which will be in business soon to rule on matters of conservation.

Governor Fannin named these men to the board: Ernest Chilson, Coconino County rancher; William E. Kimble, Bisbee attorney; Keith Walden, Tucson businessman; M. F. Wharton, Phoenix businessman; and Dr. Charles Kalil, Phoenix physician. Obed M. Lassen, state land commissioner, is the ex-officio member.

Exploration men say keep your eyes on:

...Iowa—it's good bet to be the next new oil-producing state. Champlin wildcat is dry but the well showed such good reservoir conditions geologists think big oil may exist at shallow depths in the state (p. 100).

...Southwestern Kansas' Hugoton field. The Council Grove Permian zone is the objective of a coming play. It was overlooked in the big push to Pennsylvanian production. Council Grove lies just 200-300 ft. below Hugoton field pay but has not been drilled into much. Several scattered discoveries, however, point up its possibilities.

...Northwest Alberta's Simonette Devonian D3 reef area. It should become the most active exploratory arena in Western Canada during the last half. Shell and others have staked a half dozen tests in the area. The group already has three producers with up to 200 ft. of pay.

...Best well of year in Illinois basin. It's Coy Oil's 1 Virgil T. Murphy east of Enfield in White County. Flow was 2,160 bbl. in first 24 hours through choke in Aux Vases Mississippian sand at 3,120-45 ft.

Interesting wildcat now being drilled in northwest Pecos County, Tex., may become the deepest ever drilled by Magnolia Petroleum Co.

It's the 1 Moore set for total depth of 20,500 ft. and maybe more.

So far, oil recovery in the Wolfcamp beds has been reported at two levels. Well unloaded about 200 bbl. of oil in 15 minutes at 10,895 ft. Later tests between 10,937 and 11,873 ft. also had good shows. Latest 4-hour test at 12,382-447 ft. recovered 1,020 ft. of free oil and 300 ft. of oil-cut mud. Magnolia is drilling ahead near 12,500 ft.

▼ ▼ ▼

Butane may disappear from the retail market.

LPG marketers are stepping up their urgings on customers to convert to propane. Involved are new, higher pressure tanks; tests of lines; and adjustments for appliances.

Reason for the switch: Demand for butane as charge stock for refineries, chemical, and synthetic-rubber plants. This is a steady, year-round market for the liquid gas at a good price.

Propane has dominated the market in colder sections of the country for some time—predictions are it'll supplant butane mix in the southern climates very soon.

▼ ▼ ▼

Indicative of interest in liquefied methane is special study made by North American Phillips Co. for its Norelco cryogenerators.

Study claims that shipboard reliquefying systems made by Norelco will give about 7% savings over most economical

noncondensing system. Investment can be amortized in less than 3 years.

▼ ▼ ▼

Airline management already is moving to cut down the fuel appetites of their brand new jet planes.

American Airlines will convert the 50 Boeing 707's it has bought or ordered from turbojets to turbofans. Its 25 Convair 600's will also be so equipped.

Turbofans will increase thrust an estimated 40% and lower fuel consumption possibly 20%. At consumption rates as high as 2,200 gallons an hour, the savings in fuel will quickly repay the added cost.

Neoprene fire hose jacketed with Dacron is a comer.

Ashland Oil & Refining will convert all of its fire hose to this type.

Ashland Safety Chief John Wilson says the hose stands up well when exposed to oil, chemicals, and abrasion. It resists mildew and thus doesn't have to be dried thoroughly. It's undamaged by rats and mice, has high strength, and easy handling characteristics.

Petrochemical production and sales set a record pace last year, latest statistics show.

The resurgence, however, came during a period of soft prices, with this result: Output up 15%, sales up 16%, but dollar income up only about 1%.

Outlook, however, is for continued improvement in petrochemicals this year (p. 114).

▼ ▼ ▼

Chemical engineers graduated this spring enjoyed a 2% increase in their average starting salary.

Lehigh University report shows 1959 graduates got $486 to start this year compared to $477 in 1958. Top salary offers in the class went to engineering physicists who averaged $525 a month. Average for all engineers was $493 compared to $474 a year ago.

Unemployment among geologists gets an analysis by Dr. A. I. Levorsen on p. 110.

His comments:

...The cause is world oversupply of crude.

...Opportunities for younger geologists will be less in petroleum exploration for next few years.

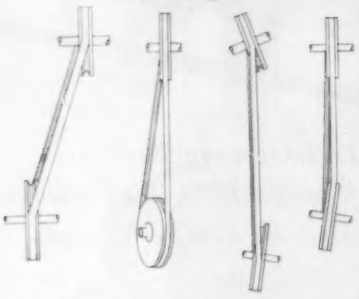
...Training will become tougher with more graduate work.

...The cure is hard work—in the older areas, in undeveloped regions, in basic geological information by state surveys, and in intense activity by the individual geologist.

B.F.Goodrich V belt briefs

TIPS ON THE CARE, MAINTENANCE AND SELECTION OF V BELTS FOR INDUSTRY

Belts that go straight live longer



When V belts enter and leave the pulley grooves at an angle, it causes the sides of the belts and pulley sidewalls to wear excessively. This condition can be caused by drive shafts that aren't parallel, by sheaves that are out of line, by wobbly sheaves, or by a bent drive shaft.

Simple instructions on how to make sure that the drives are parallel, and to check for wobbly sheaves or bent drive shafts can be found in the B.F.Goodrich V belt maintenance manual. Ask your B.F.Goodrich distributor for a copy.

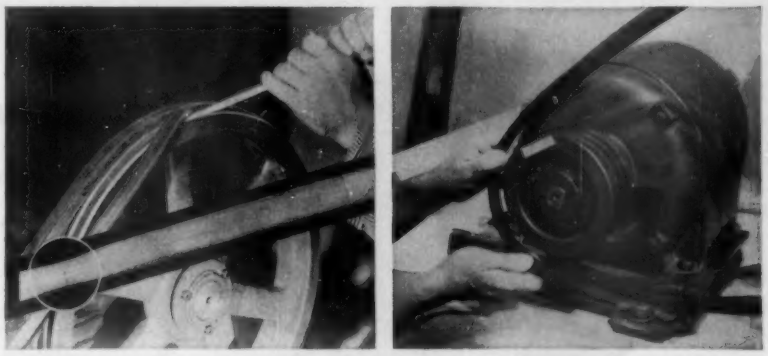
What do V-belt sizes mean?

V belts are marked with a letter which indicates their width across the top and a number to indicate their length. Standard belt widths are coded: A, B, C, D and E.

Here are the belt cross sections and minimum recommended pitch diameters to obtain maximum V-belt life.

Section	Recommended Range of Small Sheave Diameters (Inches)	Absolute Minimum Pitch Diameter (Inches)
A	3.0″ to 5.0″	2.6
B	5.4″ to 7.5″	4.6
C	9.0″ to 12.0″	7.0
D	13.0″ to 20.0″	12.0
E	21.0″ to 28.0″	18.0

Which is the right way to install V belts?

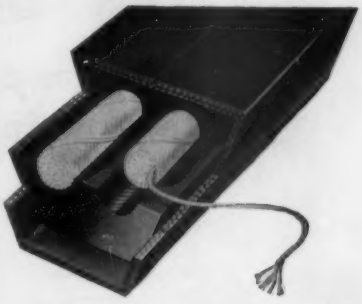


V belt at left is not being installed correctly. When a belt is forced into the sheave with a screwdriver or any other wedge, the outer fabric is often ruptured and cords broken. To install V belts correctly, move driver unit forward so belts can be slipped easily into sheave groove without damage.

What caused this V belt failure?

Answer: There could be several causes: Severe back bend idlers, improper storage, or excessive ambient operating temperatures. To prevent, check storage conditions. If back bend idler cannot be avoided, figure number of belts again with additional service factor. (See B.F.Goodrich Multi-V belt handbook.) Avoid ambient temperatures over 150°.

Here's why Grommet belts grip better



See all the rubber surrounding the twin grommets in this B.F.Goodrich belt? It has more rubber in relation to belt size than any other belt. Grommets are cord loops made like twisted cables, except they are endless. Because these grommets are endless, have no stiff overlapping cords, they are more flexible, grip the sheaves better. Size for size, Grommet belts give ⅓ more gripping power with less slip.

Call our oil field warehouses

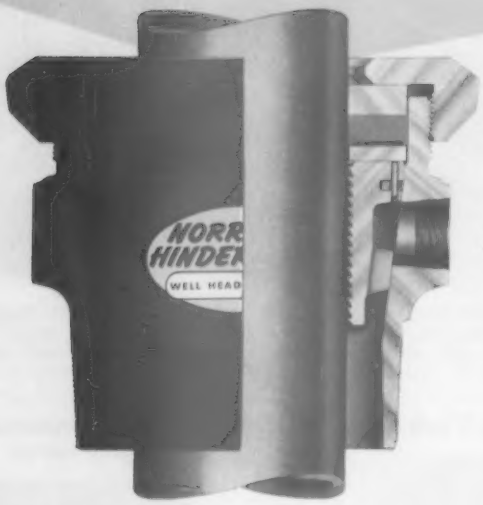
For help in selecting V belts for any kind of service, call any of these B.F.Goodrich warehouses: Los Angeles, Great Bend, New Orleans, Hobbs, Oklahoma City, Tulsa, Dallas, Houston, Odessa, Wichita Falls. *B.F.Goodrich Industrial Products Co., Dept. M-647, Akron 18, Ohio.*

Keep mud pumps pumping— Driving mud pumps is rough on V belts. They're jolted by shock loads, must stand dirt, dampness, all kinds of weather. B.F.Goodrich Grommet belts have proved they can take this kind of abuse. They're stronger, stand shocks better, don't stretch or slip as much as other belts. They eliminate frequent take-ups, prevent costly breakdowns, and, in some oil field installations, have tripled belt service.

B.F.Goodrich V belts

For Economy Plus Flexibility

buy NH Casing Heads



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- *Removable Drilling Flange*
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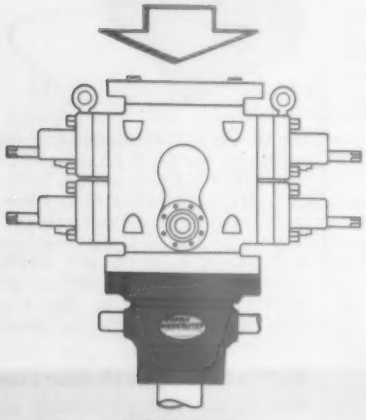
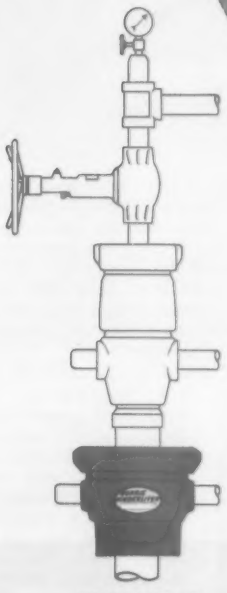
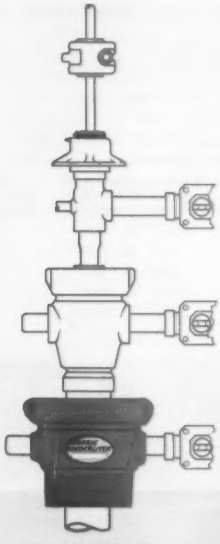


DRILLING



FLOWING



PUMPING

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W. C. NORRIS, MANUFACTURER
DIVISION OF DOVER CORPORATION
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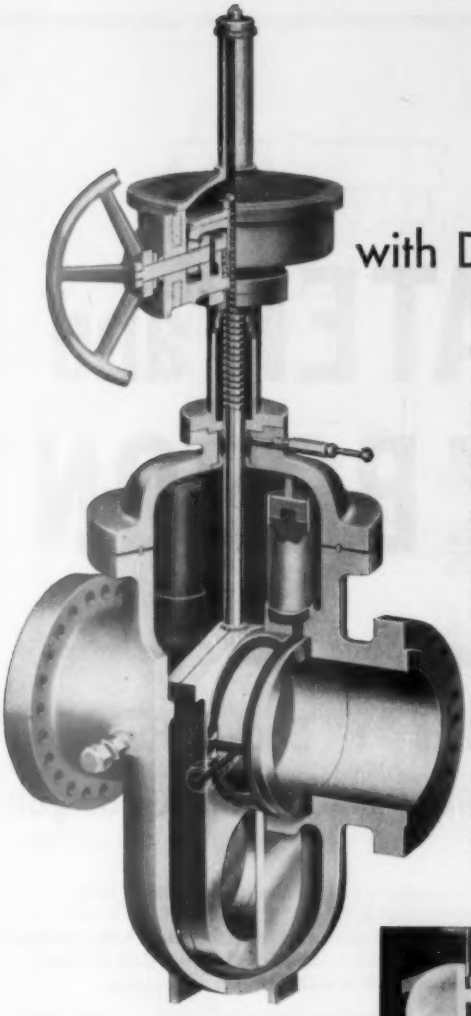
NEW ADVANTAGES "GO ON THE LINE"

with DARLING-McEVOY Conduit Valves



Above: *Cutaway showing heavy, self-aligning gate and parallel seat assembly, with one of the two sealing systems indicated.*

Compare these features with *any* other pipe line gate valve:

1. **EVERY CLOSURE LEAK-PROOF.** No forcing. Positive automatic self-sealing under line pressure between seats and gate and between seats and body by means of sealing compound.

2. **NON-DIRECTIONAL.** Flow may be in either direction. Sealant cylinders operate independently.

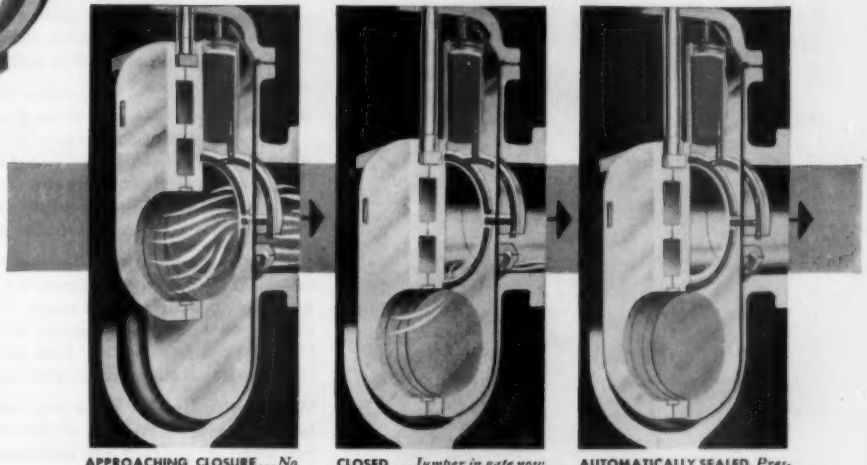
3. **TWIN SEALANT RESERVOIRS.** One for each port. Sealant feeds automatically to downstream side only.

4. **NEGLIGIBLE SERVICING.** Leak-proof closure requires very little sealant. Reservoir capacity ample for 50 to 80 operations dependent on differential pressures.

5. **SMOOTH, FULL FLOW.** No impediments. No turbulence. No pockets to collect sediment.

6. **EXCEPTIONAL PERFORMANCE AND LIFE.** Self-aligning gates. No wedging. Non-distorting seats, protected when valve is open or closed.

Darling-McEvoy conduit valves, made in 4" and larger sizes, are fully field proved and are now operating continuously on various major lines. For complete information on the self-sealing feature and many other advantages of this unique valve, ask for Bulletin 5402.



Right: *Diagrams of closure action on downstream side of gate.*

APPROACHING CLOSURE... *No loss of sealant as sealing groove in seat is disconnected from reservoir until gate is fully closed.*

CLOSED... *Jumper in gate now permits differential pressure to feed sealant into seat groove to check any remaining flow.*

AUTOMATICALLY SEALED. *Pressures again in balance. Tightness established. No additional sealant used until again needed.*

DARLING VALVES

DARLING VALVE & MANUFACTURING COMPANY

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

WATER and BORON

give Grade "Y" Sucker Rods remarkable resistance to fatigue

The high elastic strength . . . and, therefore, the high fatigue resistance . . . of "Oilwell's" Grade "Y" Sucker Rods, is an excellent example of what research can do to make a better product. Water and boron are common materials; but how they are used in manufacturing sucker rods makes the big difference.

The Grade "Y" steel does not contain much boron . . . just about .0005 per cent. But boron alone does not give these rods their high resistance to fatigue. That comes from the water . . . . when the rod is *liquid quenched.* Liquid quenching brings out the optimum properties of boron in the alloy and gives Grade "Y" Sucker Rods the highest available elastic strength . . . the greatest possible resistance to the stresses which cause fatigue.

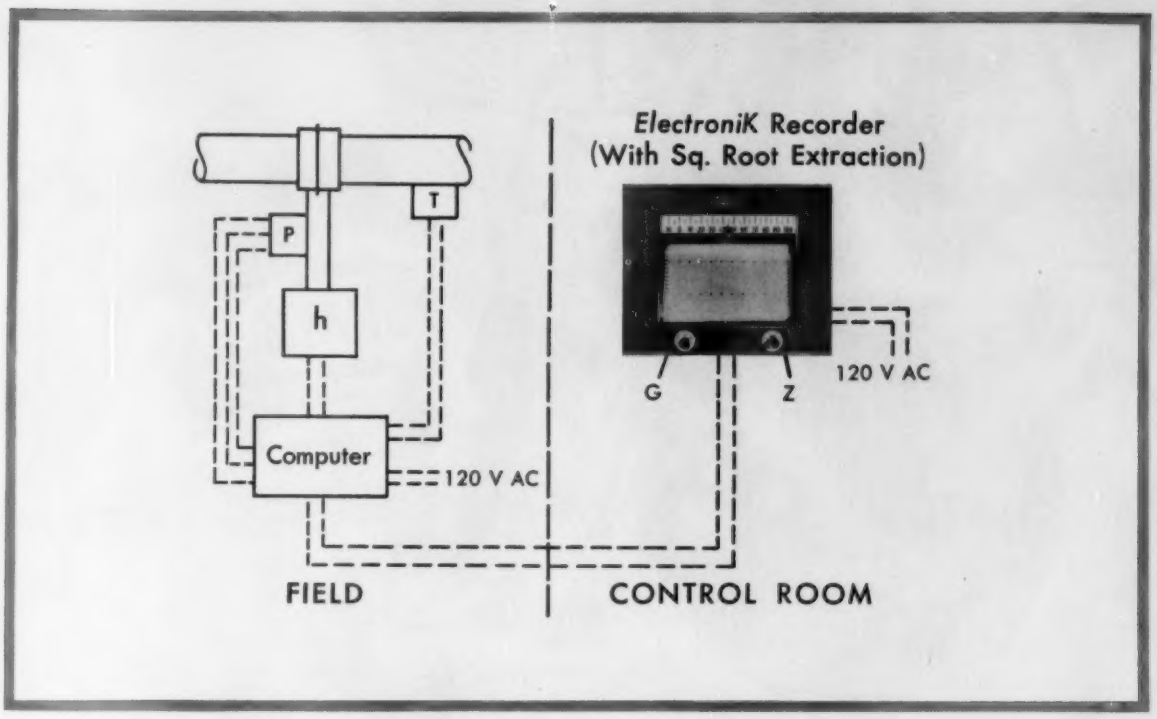
If your wells are deep—either non-corrosive or inhibited—Grade "Y" Rods were designed for your use. They will eliminate much lost production and costly "fishing" time . . . and they will prolong service life of the string many months beyond other, more expensive so-called "high strength" rods. They can be furnished with standard or slim hole, Grade "S" or Co-Hard couplings.

Why not try Grade "Y" in your next well? Run an "alternate rod" test, with every other rod on the string an "Oilwell" Grade "Y" and learn for yourself how economical they really are.

USS and "Oilwell" are registered trademarks

USS **Oil Well Supply Division of United States Steel**

Executive Offices—Dallas, Texas
Export Office—30 Rockefeller Plaza, New York 20, N. Y



New Honeywell all-electric Gas Flow Computer

measures and records mass flow rate automatically and continuously

Here's how the Honeywell gas flow computer solves a gas flow equation:

$$Q = K\sqrt{\frac{hP}{TGZ}}$$

Where Q = mass rate of flow, scfh
h = differential pressure, inches of water
P = static pressure, psia
T = flowing temperature, °R, (°F + 460)
G = specific gravity
Z = super-compressibility
K = orifice flow constant

The *ElectriK Tel-O-Set* △P/I transmitter measures *h*; an absolute pressure transducer measures *P*; and a resistance thermometer bulb measures *T*. The analog computer multiplies *h* by *P* and divides by *T* . . . and sends a resultant millivoltage to the *ElectroniK* recorder. The recorder applies the correction factors G and Z, extracts the square root, and records the resultant mass flow Q.

Easily linked to telemetering and remote control systems, supervisory control, data handling and industrial process computers.

No more tedious, time-consuming calculation of gas flow. This versatile gas flow computer does it for you . . . automatically, continuously. It measures and records gas flow in terms of standard cubic feet per unit time, and is the only all-electric system of its kind.

The Honeywell gas flow computer consists of an *ElectroniK* strip chart or circular chart recorder, a power supply, a standard resistance thermometer, an absolute pressure transducer, a voltage-divider type computing circuit, and an *ElectriK Tel-O-Set* differential pressure-to-current transmitter. The transmitters, transducers and computing circuitry can be mounted *near the orifice*, and only two wires bring the signal into the recorder in the control house. Field-mounted equipment available in explosion-proof housings.

There are many optional accessories. The recorder can be supplied with pneumatic or electric control, retransmitting slidewires, digital encoder, motor or servo-driven control index or pneumatic *Indexet*, hi-lo alarms, auxiliary contacts, pulse telemeter transmitter, and many other options.

Get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

First in Control

DRILL THICK SHALE FORMATIONS WITH LESS TROUBLE

SHALE BAN* additive makes a chemical mud that inhibits hydration and dispersion of formation clays both as shales and as clay particles in sands. This means lower mud and drilling costs—greater probability of successful drilling of long mud making shale formation—and less damage to dirty sands.

*Trademark, Baroid Division, National Lead Company.

1. SHALE BAN additive reduces the build-up of drilled solids; results in less mud to condition with weight materials, chemicals and filter loss reducing agents because less mud is made.
2. SHALE BAN additive keeps the hole to gauge resulting in less mud volume to treat—more efficient cuttings removal and less cement when casing is set.
3. SHALE BAN additive reduces tendency of drill pipe to stick during salt-water flows because the shales are "pickled" by the mud filtrate and the mud is tolerant to salt-water.
4. SHALE BAN additive can result in production increases because clays do not hydrate and swell to reduce permeability. Flocculated mud particles are less likely to penetrate sand formation pores.

Specify SHALE BAN mud and get the advantages of less mud cost, lower drilling cost, less trouble and increased production. Write now for technical bulletin.

BAROID DIVISION • NATIONAL LEAD CO.
P. O. Box 1675, Houston 1, Texas

Send me your bulletin on SHALE BAN additive.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

When you buy Baroid — you buy the Best!

BAROID

BAROID DIVISION • NATIONAL LEAD CO.
Main Office: P. O. Box 1675, Houston 1, Texas

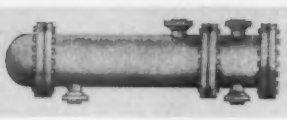
5799

what do thermal ratings mean to an ear of corn?

. . . accurately rated Western heat exchangers, used by Grand River Chemical Division of Deere & Company at Pryor, Oklahoma, play a significant role in Grand River's production of urea, using natural gas as the feed. As a commercial fertilizer for crops of all types, urea is increasing rapidly in popularity.

From fertilizer to nuclear power, the petrochemical industry demands unerring accuracy and efficiency from heat transfer equipment. Western is happy to serve these ends.

A Western representative is ready to discuss your processing problems at your convenience.

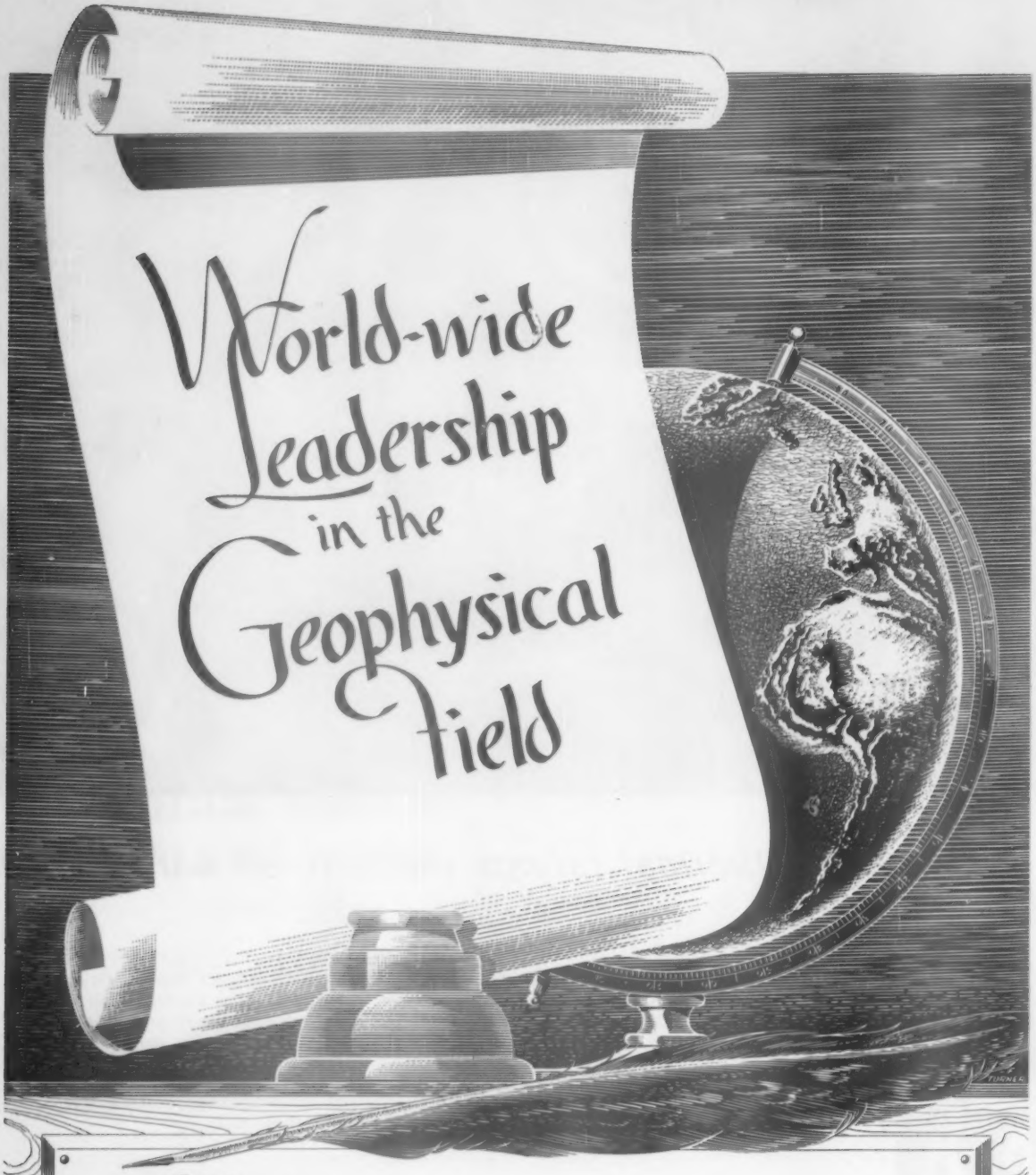


WESTERN

HEAT EXCHANGERS

WESTERN SUPPLY COMPANY

P.O. Box 1888 – Tulsa, Oklahoma

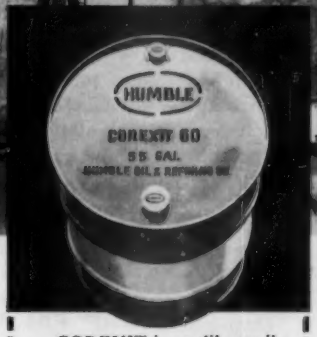


Western GEOPHYSICAL COMPANY

AND ITS AFFILIATES

Principal Office: 523 WEST SIXTH STREET • LOS ANGELES 14, CALIFORNIA

AFFILIATE AND REGIONAL OFFICES THROUGHOUT THE WORLD



COREXIT
cuts lifting costs . . . saves up to $1,000 a year per well

COREXIT saves you money. It prolongs the life of your sub-surface equipment, reduces the number of well-pulling jobs and prevents loss in production. Savings up to $1,000 a year per well are not unusual.

The initial COREXIT treatment cleans up your sub-surface equipment, displacing corrosive brine and loose scale from metal surfaces. Then it builds up a tenacious and lasting protective film on these metal surfaces to prevent further corrosion and hydrogen embrittlement. Periodic COREXIT batch treatments with a few hours circulation of the production will give continued protection.

COREXIT is an organic, adsorptive-type corrosion inhibitor. It is available in many different formulas to meet the needs of every producer. It is non-toxic and easy to handle. It has no objectionable odor.

Save your money — use COREXIT!

COREXIT is readily available from Humble wholesale plants throughout Texas and New Mexico. Call the one nearest you for quick on-the-lease or plant delivery, or phone or write:

Humble Oil & Refining Company
Consumer Sales
P. O. Box 2180
Houston 1, Texas

COREXIT is also available through these companies:

in Oklahoma and Kansas—

Pet-Chem, Inc.
Mayo Building
Tulsa, Oklahoma

in Illinois, Indiana and Kentucky—

T. E. Bennett Chemical Company
P. O. Box 245
Salem, Illinois

in Western Canada—

Rice Engineering & Operating Ltd.
10509-81 Avenue
Edmonton, Alberta

HUMBLE OIL & REFINING COMPANY HUMBLE

You can't buy any other tower with the

SERVICE LIFE OF A MARLEY CLASS 600 DOUBLE-FLOW

Years . . . many more years than those now considered usual service life of cooling towers . . . are engineered into every Marley Class 600 Cross-Flow. Years of full performance; years of low maintenance; years for longer amortization. By incorporating (after comprehensive research) modern inert materials and protective processes throughout Class 600 design, Marley engineers have achieved an over-all durability that prolongs tower life expectancy beyond any current norm.

GLASS FIBER REINFORCED POLYESTER —steel-strong and impervious to corrosion—makes many components invulnerable to corrosion and decay; GRP molded **Fan Blades** are shatter-proof, shock resistant and completely unaffected by moisture or corrosive atmosphere. **GRP Fill Support Grids** position fill bars perfectly and permanently—no nails needed. **GRP Timber Connectors, GRP Retaining Rings** and **GRP Fan Cylinder Positioning** cannot corrode nor are they subject to oxidation that encourages decay in contacted lumber . . . they add vitality to critical areas, as do **Ceramic Timber Ring Connectors** and **Louver Supports** molded of rigid linear polyethylene.

ASBESTOS CEMENT BOARD — fire-safe and wear-proof—forms casing walls and wide, functional louvers that characterize Class 600's.

MARLITH PRESERVATIVE TREATMENT is life-insurance for tower lumber. Applied after fabrication, every piece of wood is deeply and thoroughly impregnated with toxic, proven protection against rot and decay.

MARLEY®

The Marley Company

STOP GO

Needless/Plug/Valve Repairs to HARRISBURG LubeWrench

Positive Valve Lubrication With Each Operation

The Harrisburg LubeWrench saves costly plug valve repairs by automatically lubricating the valve each time it is operated. When the handle is pulled down to open or close the valve, a predetermined amount of grease is pumped into the lubricating channels of the plug. Upon release, the handle returns to its original position ready to lubricate the valve again when it is opened or closed!

One Harrisburg LubeWrench fits all valve sizes from ½" through 4", and may be operated over one hundred times between grease refills. When the grease cap is empty, the handle cannot be operated unless the pawl is released — a constant reminder to refill. Write today for complete information, or call your Harrisburg representative.

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

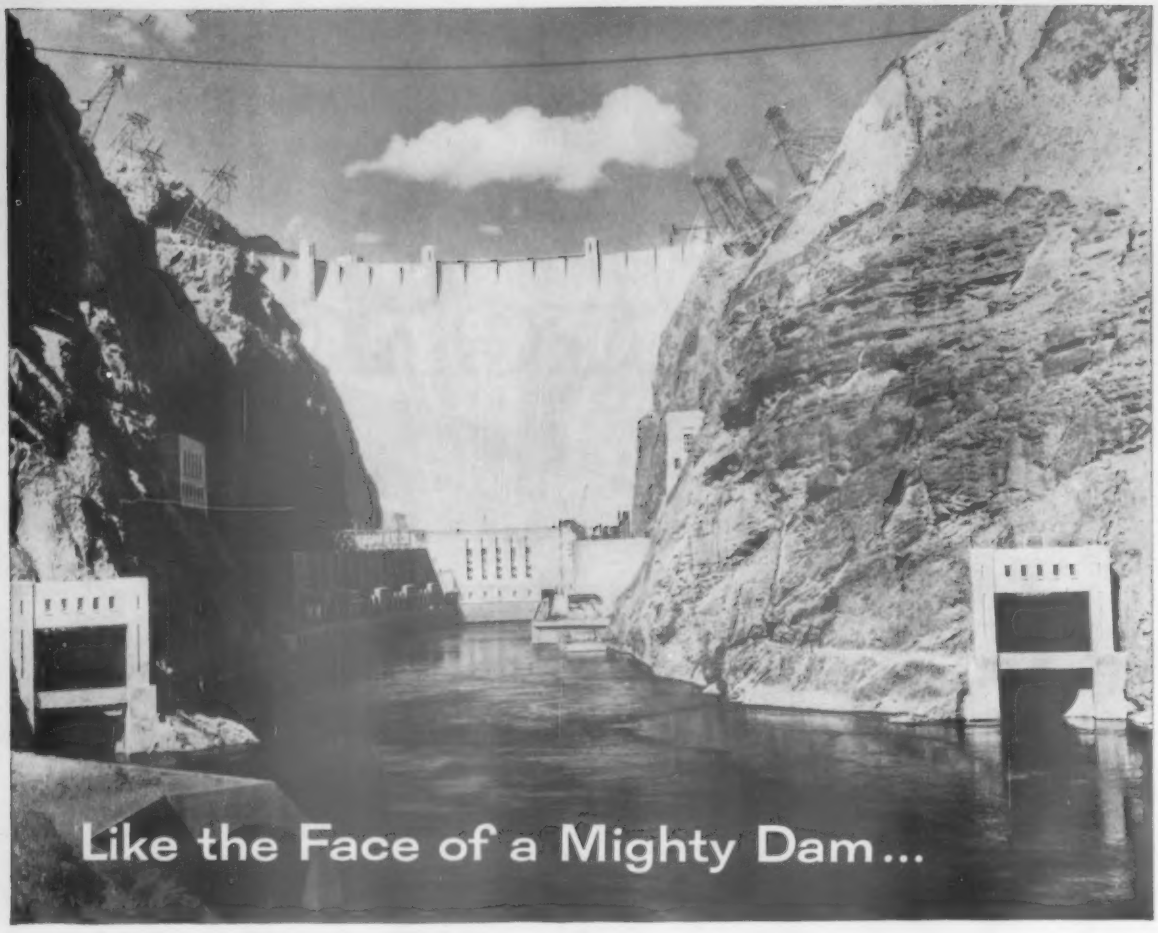
Exclusive World-Wide Distributor:

HARRISBURG, INC.

OIL FIELD SALES AND SERVICE

P. O. BOX 334, FORT WORTH 1, TEXAS

Address Inquiries to: P.O. BOX 1053, HOUSTON 2, TEXAS



there's more to Cities Service than meets the eye!

Where dams go, things grow. Floods cease, irrigation begins. Farms spring up . . . towns develop . . . and factories hum with new-found, low-cost power.

OIL'S FIRST CENTURY
BORN IN FREEDOM
WORKING FOR PROGRESS

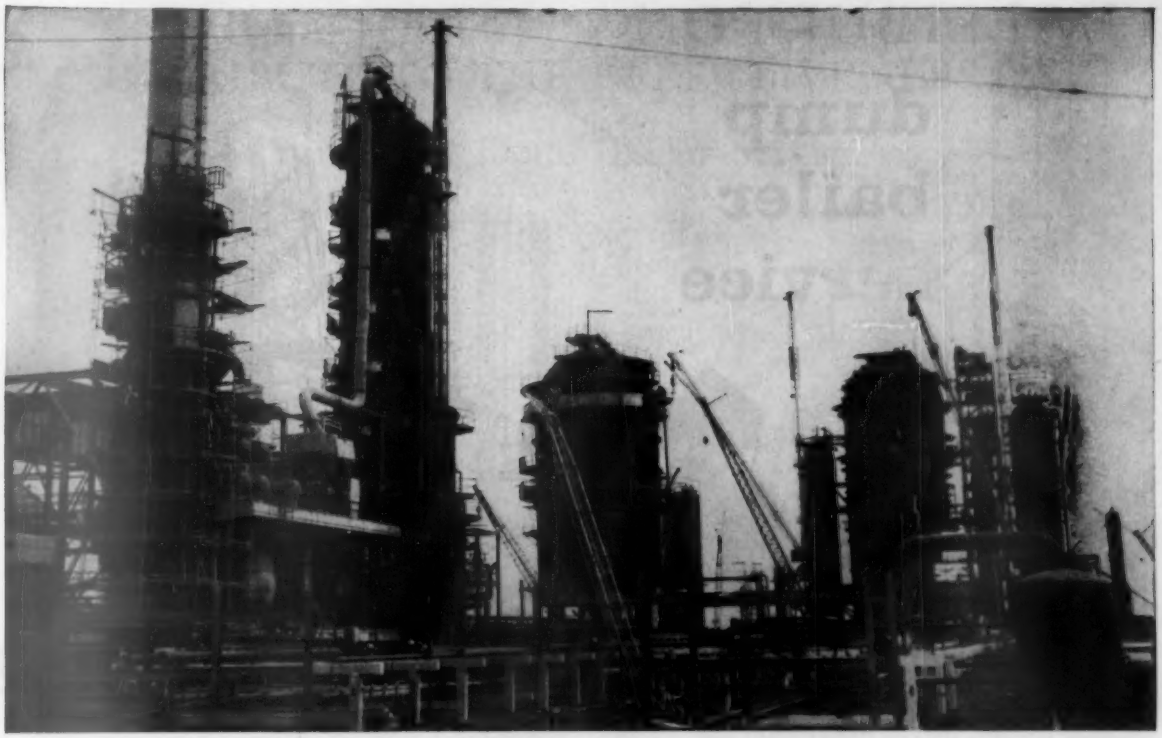
Factories hum . . . jobs are created . . . commerce thrives, thanks to abundant, low-cost power. Viewing the face of a dam, however, these facts are often forgotten . . . obscured by the mighty spectacle of the dam itself.

Also forgotten . . . if known at all . . . are the facts of oil company enterprise, making it possible to drive confidently into a service station with an order to "fill 'er up." Who thinks then of far-off drilling crews, thousands of miles of pipelines, giant refineries, a fleet of supertankers, or modern research laboratories?

Yet the job could not be done without all these things. To do its share in serving the nation, Cities Service has invested a billion dollars in modern facilities...and to be ready for the even bigger job of tomorrow, it is constantly expanding. In two years, Cities Service has spent over $350 million on its progressive program.

Only in this way can America be given what it must have for progress—more jobs, more and better petroleum products.

CITIES SERVICE



A dozen vessels built by Newport News were furnished under contract with C. F. Braun, Inc., of Alhambra, Calif., design engineers for the ultra-modern Delaware Flying A Refinery of the Tidewater Oil Company located 15 miles south of Wilmington.

Newport News builds 12 major components for new Flying A 130,000-bpd refinery

This is the Tidewater Delaware Flying A Refinery while under construction near Wilmington.

Newport News fabricated 12 of its major vessels — 2 of which are the largest such units ever built: a 250′ Orthoflow fluid "cat cracker" converter and a 225′ reactor scrubber of the fluid coker.

More notable than size, though, is the quality of the Newport News fabrication.

Coke-out screens in the reactor scrubber, for example, are made of 704 12% chromium segments. Welded together with accuracy, they provide 45% clear opening . . . with opening tolerances less than 1%.

You get expert fabrication, the skill of specialists when Newport News builds your equipment. When you want reactors, pressure vessels, vacuum tanks and the like, sub assemblies or weldments in almost any size or shape, get a bid from Newport News.

Send for newly published, easy-to-read, illustrated booklet, "Facilities and Products". It describes the many ways in which Newport News can help you with present or future projects. Write for your copy today.

Full advantage was taken of the Newport News deep water loading facilities for transportation of all of the equipment by barge. Shop erection prior to shipment assured fast, trouble-free field assembly.

Engineers: Desirable positions available at Newport News for Designers and Engineers in many categories. Address inquiries to Employment Manager.

Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia

HALLIBURTON

dump bailer service

SPECIAL SERVICE FOR OIL WELLS

For any of these remedial services, Halliburton Dump Bailer Service can help save you time and money, trouble and worry:

- Nitro-Glycerin Shot Tamps
- Plug Back Jobs
- Water Shut Off
- Caving Conditions in Cable Tool Holes
- Plug Below Damaged Pipe
- Seal for Permanent Bridge Plugs
- Plug to Set Liners
- Special Bailer for Dumping Sand and Gravel
- Dumping Caustic for Removing Magnesium Windows and Bridge Plugs
- Special Head and Stuffing Box for Dump Bailer Braden Head Squeeze Jobs

When your wells need fast treatment, call Halliburton Dump Bailer Service! Ready 24 hours a day, every day of the year.

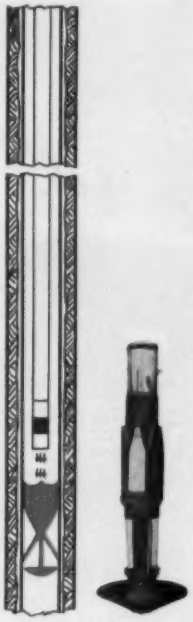
HALLIBURTON
OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

THESE TOOLS AND MATERIALS CONTRIBUTE TO THE EFFECTIVENESS OF

Halliburton Dump Bailer Service

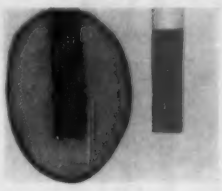
LIMIT PLUG

... is used to form a bridge in casing to stop or limit the downward travel of a dump bailer, gun perforator or well fluid to the point in the casing where it is set. Many successful services are economically accomplished through the use of this tool. All parts are drillable, but of sufficient strength to hold squeeze pressures up to 2,000 psi applied from above. The limit plug is not designed to stop or limit upward movement of fluids.



"DB" BRIDGING BASKET

... is an efficient umbrella type that will bridge holes from 4½" to 15" I.D. in casing or open hole. The drillable basket has been successfully used on hundreds of dump bailer jobs and has shown its efficiency in wells exceeding 13,000 feet in depth.... Attached by a special adapter, the basket mechanically operates from Dump Bailer bottom. Is lowered to any depth in open hole or casing with Dump Bailer Bridging Material... either Cal-Seal, Hydromite or Hydro-Lok (PC-11)... when bridge point is reached, a pick up on bailer section throws annulus fluid load against basket, tripping four steel legs, and releasing legs into side of hole or against casing. Bailer bottom opens and material is dumped into basket for a bridge.



RESIN-CEMENT

... is a slurry composed of portland, Hi-Early or Slo-Set Cement, water and thermo-setting resins, suitable for application in wells with temperatures ranging from 80° to 230°F. It is designed for open bottom hole plugs, setting around casing shoe or opposite water zones, and other remedial work on oil or gas wells, particularly where ordinary cementing materials fail. The set Resin-Cement is permanent in nature, is not attacked by oil, gas or salt water, and will resist the action of common acids. With these qualities, any proven plug or shut-off should be permanent and impermeable.

CAL-SEAL

... is a super-strength gypsum cement with stabilized, controlled setting times, eliminating the delays necessary with other materials. Upon setting—after remaining fluid during 80% of its setting time—Cal-Seal hardens quickly and one hour after setting attains a compressive strength of 2,500 psi. Cal-Seal has a linear expansion of 0.3% at time of set which gives an unusually tight plug. May be used at temperatures up to 140°F., with special Cal-Seal HT suitable for well temperatures to 170°F. Cal-Seal is readily drillable and the permeability of the set materials effectively controls unwanted gas or oil.

HYDROMITE

... is a waterproof plastic cement, composed of a special gypsum cement and a powdered resin, especially adapted for dump bailer service. The setting time can be controlled to very close limits and the initial set takes place in from 75 to 100 minutes. It will set in temperatures ranging from 60° to 180°F. Within ten to fifteen minutes after the initial set, Hydromite has a compressive strength of approximately 1,500 psi which permits further dumping of material in the well. Full strength (approximately 4,000 psi) is obtained in from three to twenty hours, depending upon the well temperature.

DUMP BAILER SERVICE

284 SERVICE CENTERS—JUST MINUTES AWAY FROM YOUR WELL

"wherever oil men gather"

Oil men aren't the type to "moon about," wishing for new worlds to conquer. Their demeanour demands dynamic action . . . whether it's in exploration, drilling, production or marketing. When oil men get together, their conversation is just as lively . . . richly colored with the terminology of the petroleum industry. And when the talk turns to money matters, you're sure to hear someone say, "For my money, it's The Fort Worth National Bank."

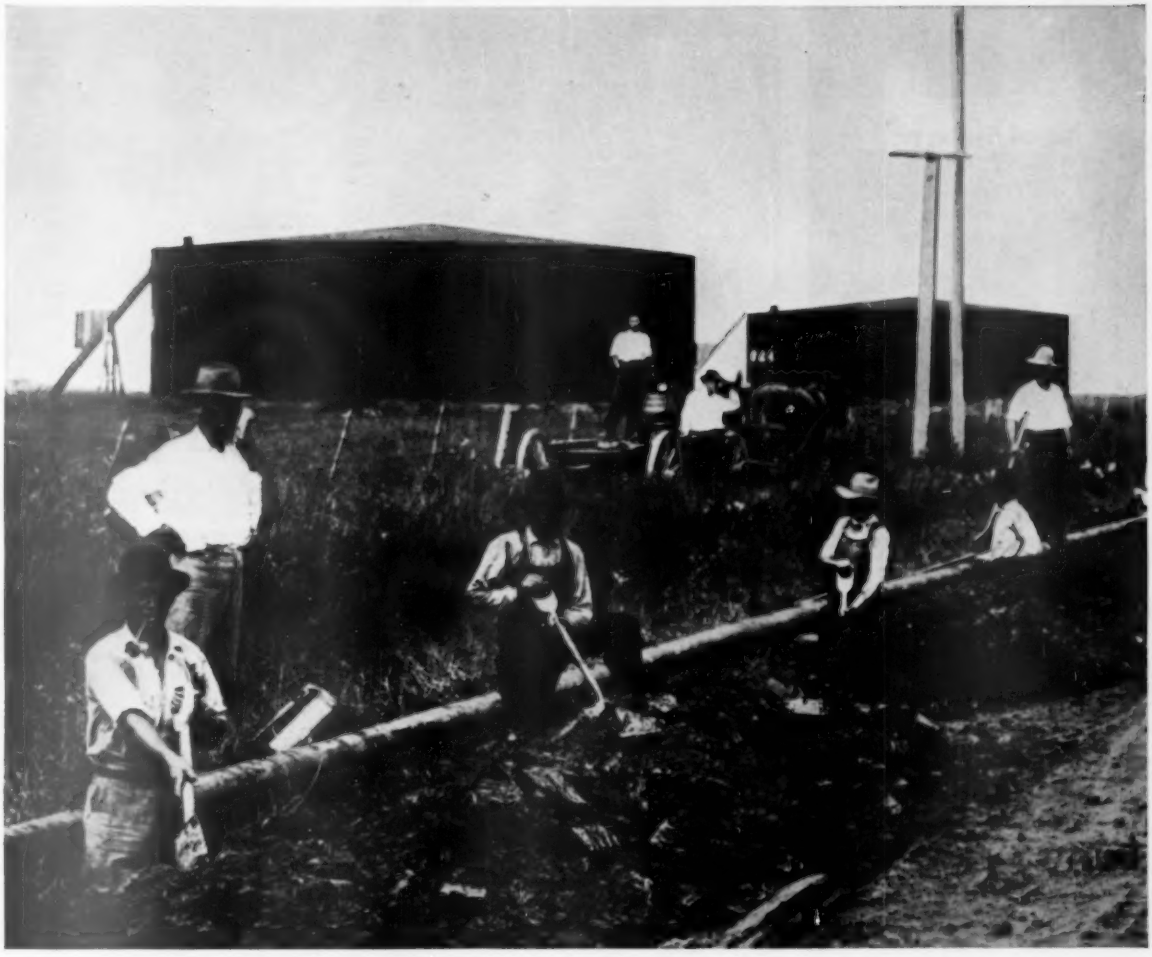
THE FORT WORTH NATIONAL BANK

Helping Build a Greater Fort Worth and Southwest

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

CAPITAL AND RESERVE ACCOUNTS OVER $20 MILLION

The underground road to market



▲ **YESTERDAY.** Texaco's early growth was speeded by its promptness in getting pipelines to rich new oil fields as they were discovered. Texaco was a pioneer in constructing longer, more strategic pipelines. In fact, one of the first acts of Texaco when it was born in 1902, was to complete a line from the fabulous Spindletop field to Port Arthur.

◀ **TODAY.** More oil is transported to market by pipeline than by any other carrier. Texaco's own 7,000 mile pipeline network is an important factor in the efficiency of its integrated operation. To the consumer, this means more and better Texaco products at lower cost. And it symbolizes the enterprising spirit that characterizes Texaco's corporate operations.

TEXACO

. . . CONSTANT PROGRESS
IN OIL'S FIRST CENTURY

75

There are 75 reasons why J&L tubular products are of highest quality

J&L makes over 75 tests and inspections of its tubular products. Here are 18 of them.* This stringent control assures a quality never before attainable in the industry.

1 This ultra-sonic tester is one of the most advanced process control devices used in pipe-making. It provides an immediate picture of weld soundness in all J&L Electricweld Line Pipe.

8 Five lengths of Jal-Con-Weld standard pipe undergo simultaneous pressure testing on this modern Schloemann hydrostatic tester.

9 Here Jal-Con-Weld standard pipe is being wound around a mandrel. This is another test of the ductility of the pipe and the strength of the welds.

10 This is a flattening test to determine strength of the weld, ductility and other qualities of the steel in Electricweld Line Pipe.

14 These inspectors are checking thread alignment on Buttress Thread Couplings. Proper alignment is essential to good stabbing and true spinning of casing joint.

15 Each length of J&L Quench and Temper high-strength casing is subjected to full-length magnetic particle inspection. The slightest surface defect is distinctly visible under the ultraviolet light.

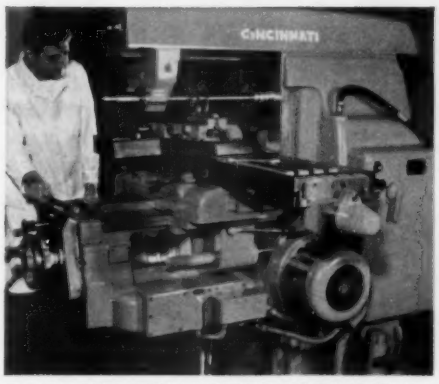
16 This inspector is testing the angle and diameter of the sealing member on pin end of Grayloc Tubing. All dimensional characteristics are checked for accuracy.

2 J&L inspectors are taking a steel sample from a basic oxygen furnace for thorough chemical analysis. A record of each heat is kept all through the manufacturing process.

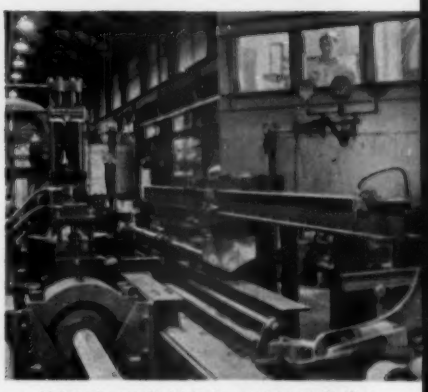
3 This Spectromet unit provides a simultaneous analysis of alloying elements in the J&L steel used for tubular products.

4 In a J&L laboratory, this metallographer is examining the structure of a steel specimen.

5 This J&L laboratory technician is testing a specimen cut from finished pipe to determine its compliance with specified yield, tensile and elongation requirements.

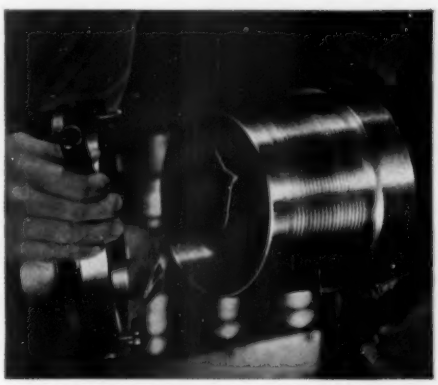


6 This milling machine operator is cutting the notch in a specimen for Charpy impact test. The Charpy test determines notch toughness of the steel.



7 This is the world's highest—pressure production tester. It is capable of applying hydrostatic pressures up to 20,000 pounds per square inch.

11 This skilled inspector is examining the internal surface and ends of J&L casing to insure further the final high quality of the product.



12 This is one of many dimensional measurement checks made on each joint of Extreme Line Casing (produced under license from National Supply Company).

13 Jones & Laughlin inspector, with surveyor-type transit, carefully checks thread alignment on integral joint drill pipe.

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

17 Upset ends of Blue Ribbon and Blue Ribbon Vanadium Drill Pipe and P-105 grade tubing are shot blasted to provide clean surfaces for magnetic particle inspection.

18 This modern collapse testing equipment exerts pressure up to 25,000 pounds per square inch . . . exceeding all published requirements.

The Arithmetic of Materials Handling

Fuller pneumatically conveys drilling mud directly into oil rig bins, from specially-fitted Bourg Mud & Chemical Co. supply ship. Ship carries 250 tons of mud, delivers at a rate of 50 tons an hour.

Sea-Going Fuller Pneumatic Conveying System Cuts Time and Cost of Vital Drilling-Mud Deliveries

The Bourg Mud & Chemical Co., Inc., of Lockport, La., is making off-shore deliveries of drilling mud by advanced Fuller pneumatic systems.

The dry mud is automatically pumped aboard oil rigs from a Fuller equipped cargo ship at a rate of 50 tons an hour—one man replacing large crews handling 100-pound sacks in cargo nets. Previously, bag handling in high seas had been either dangerous or impossible. The highly flexible bulk-handling system now operates safely and efficiently at all times.

Self-emptying hoppers designed and built by Delta Tank Manufacturing Company installed into the Bourg ship are fitted with F-H Airslide® fluidizing gravity conveyors. A 6-inch Fuller-Kinyon pump transfers the aerated material to bins aboard the rig—over distances up to 300 feet. Air pressure is supplied by a diesel-driven Fuller single-stage vane-type rotary compressor.

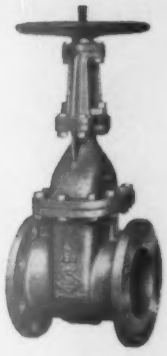
Here is a good example of Fuller's engineering experience and wide range of equipment combining to solve your materials handling problem. If you handle large volumes of dry bulk granular materials, why not investigate a simple, efficient Fuller pneumatic conveying system? For details, write or call Fuller today outlining your problem.

1311
P-171-A

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle

Fuller
pioneers in harnessing AIR



In this **Split Wedge Gate**

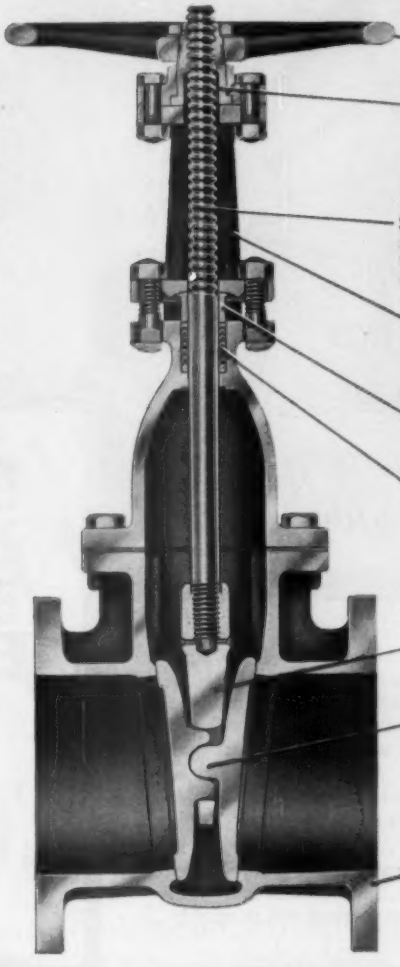
you can see why it pays to

Specify JENKINS for STAINLESS STEEL Valves, too

This picture shows the many points of excellence in the design and construction of Jenkins Fig. 1327 Split Wedge Stainless Steel Gate Valves. Compare them with any valve you know. You'll conclude that it's hard to beat Jenkins at making valves, no matter what the material.

But no picture can show the quality of the castings . . . the precision machining . . . the rigid inspection and testing that have gone into this valve. All of these are as important as design and metal alloys in assuring long, dependable, economical valve service. And, all of them are up to the peak standards for which Jenkins has been known for almost a century.

SEND FOR NEW CATALOG of Jenkins Stainless Steel Valves. You'll find in it the patterns you want, in a choice of alloys that satisfy the requirements of practically all corrosive services. Also, you'll see that these Jenkins valves meet valve industry specifications and the high standards established by the leading users of stainless steel valves. Jenkins Bros., 100 Park Avenue, New York 17.



WHEEL of high strength malleable iron designed for firm grip and easy operation.

YOKE BUSHING, easily renewable. Made of bronze, for ideal thread engagement with stainless steel spindle, to prevent seizing or galling of spindle threads. Bushing of stainless steel is optional.

SPINDLE has long thread bearing surfaces with correct lead for easy, tight closing. Screws into wedge carrier, then secured by a stainless steel pin.

YOKE BONNET has liberal space between yoke arms for easy access to packing box. Precision machined flange face assures uniform contact with gasket for a tight body-bonnet joint.

GLAND consists of two pieces — gland flange and gland follower — eliminates binding of follower in case gland bolts are tightened unevenly.

PACKING of Chevron-type Teflon in large packing box prevents leakage. Only a minimum load is required on gland, extending service life of packing.

WEDGE CARRIER connects wedge to spindle and raises or lowers it. Husky in size to stand any operating strains.

SPLIT WEDGE is the ball-and-socket design which automatically adjusts to the tapered seating surfaces for positive shutoff. The discs, revolving freely in the wedge carrier, produce a self-cleaning action on seating surfaces and reduce possibility of galling and seizing.

BODY —Through-port design for full, free flow. Ample wall thickness and good design provide extra strength to withstand stresses. End flanges conform to M.S.S. specs.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES

Sold Through Leading Distributors Everywhere

JENKINS BROS., 100 Park Avenue, New York 17, N. Y.

☐ Send the new stainless steel valve catalog

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NAME & TITLE.....

COMPANY.....

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Positive, accurate DETECTION is your best corrosion protection

COSASCO

...your key to complete corrosion control without system shutdown!

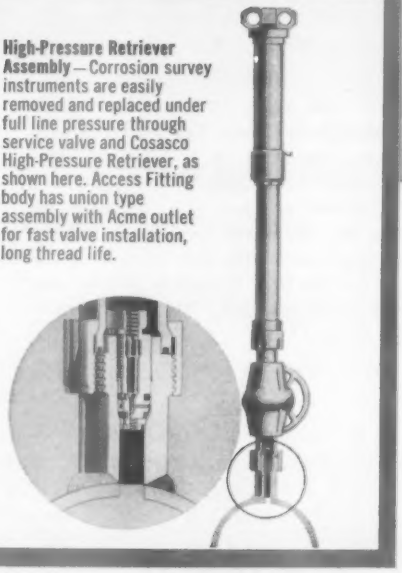
Cosasco offers the *only* complete line of corrosion survey instruments for *all* pressure conditions—up to 10,000 psi! Now you can insert and retrieve corrosion coupons, samplers, thermocouples and probes under full line pressure, without interfering with normal operations in any way. The patented Cosasco Access Fitting principle is your key to positive, accurate corrosion survey programs in transmission, storage, injection, recovery and processing equipment—at all times and under all conditions!

Free Corrosion Survey Service. If you have a corrosion survey problem, Cosasco can help you solve it. Send details and blueprints and the Cosasco solution will be worked out promptly —at no cost to you.

Cosasco offers complete line of "use-engineered" corrosion survey instruments. In representative group shown above are (l to r): Thermocouple Survey; Product Sampler; Corrosometer* Probe; Hydrogen Probe (Chiksan swivel type); Hydrogen Probe (Standard type); Disc-type Coupon Holder (bottom of line application); Coupon Holder (Standard inside register type); Coupon Holder (Extension tongue type); Pre-Stressed Coupon Holder.

*T.M. REGISTERED

High-Pressure Retriever Assembly—Corrosion survey instruments are easily removed and replaced under full line pressure through service valve and Cosasco High-Pressure Retriever, as shown here. Access Fitting body has union type assembly with Acme outlet for fast valve installation, long thread life.



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PERFECT CIRCLE CORPORATION
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EXPORT OFFICE: 3631 ATLANTIC AVENUE, LONG BEACH, CALIFORNIA

NEW
NEW
NEW
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NEW
NEW

Martin-Decker Electric Drilloger Recording Systems

For the recording of Total Hook Load, Pump Pressure, Pump Speed, Rotary Speed, Torque, Rate of Penetration, and R. P. M. Signals, and Pressure Signals to 20,000 pounds . . . Write for Bulletin No. P90.

M/D MARTIN-DECKER CORP
HOME OF THE WEIGHT INDICATOR—LONG BEACH, CALIFORNIA

ENGINE SPECIALISTS—Milt Walker, Al Busch and Frank Carter—will visit every Worthington engine compressor pipeline installation once every six months. Shown on the map are the major natural gas pipelines.

VISIT EVERY PIPELINE ENGINE

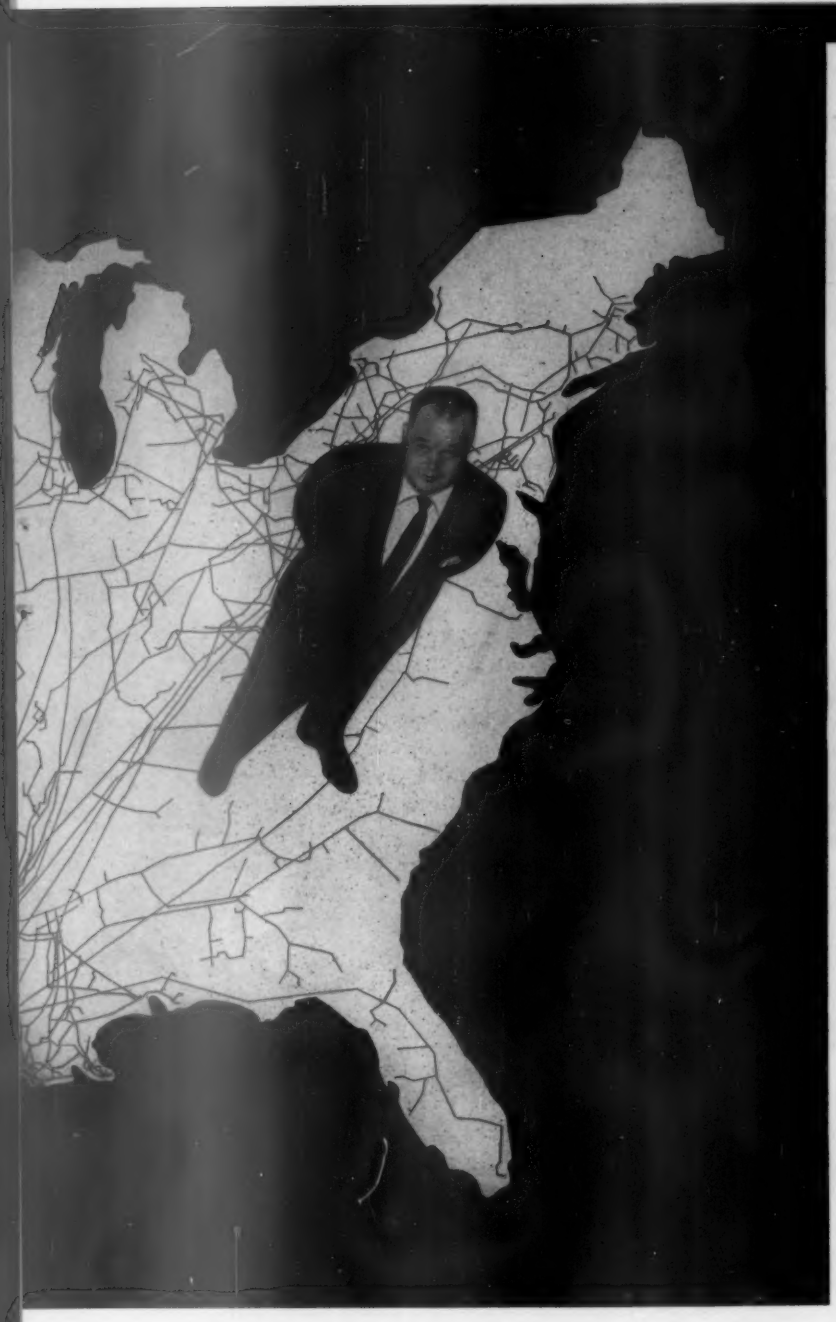
That's the schedule of Worthington's new missionary organization for pipeline engine compressors

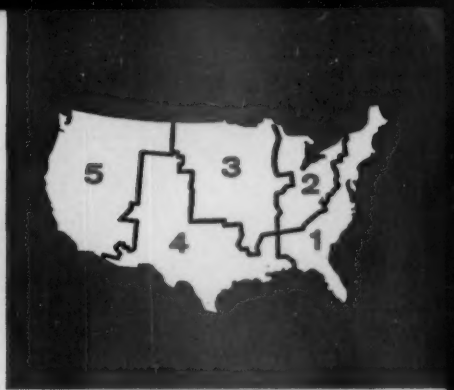
Worthington has had a missionary program for engines and engine compressors for many years.

In order to give special attention to vital pipeline installations, however, Worthington now has a program for visiting every pipeline engine compressor at least once every six months.

Three key Worthington engine compressor specialists, Milt Walker, Al Busch and Frank Carter, have been assigned to this important project. In their visits they will . . .

1. **Assist operators** in all phases of engine compressor operation and maintenance.
2. **Observe practices** in current use at each installation.
3. **Set up or modernize procedures,** based on the latest methods and practices.
4. **Submit reports** to pipeline companies giving station-by-station commentary





REGIONAL ENGINEERING & SERVICE. For routine service or emergency help, Worthington R. E. & S. personnel are available on a moment's notice.

BUFFALO FIELD SERVICE. For installation or major repairs, Worthington maintains a cadre of experienced engine personnel in Buffalo.

REGIONAL PARTS SERVICE. Large stocks of pipeline engine parts are maintained in Buffalo, Houston, Los Angeles, Calgary and Colombia, South America.

NEW SERVICE MINDED SALES ORGANIZATION. Sales and service are now combined in an organization that is more responsive to your service needs.

EVERY 6 MONTHS!

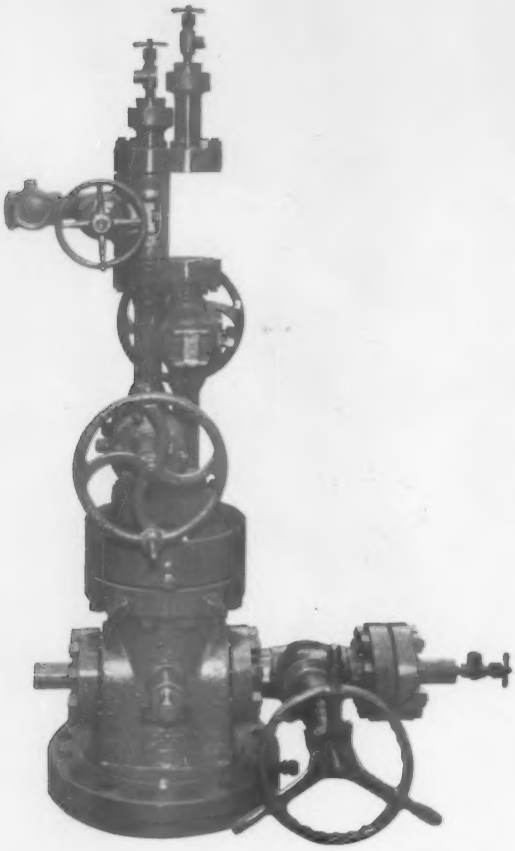
about the practices observed plus specific suggestions for future consideration.

This Worthington service is another progressive step taken by a service-minded company. Other steps include (1) Regional Engineering and Service—nearby, quickly available help on a decentralized basis, (2) Factory Field Service—a centralized pool of engine compressor specialists for installation and for major service problems, and (3) Regional Parts Service—depots of engine compressor parts are maintained in Buffalo, Houston, Los Angeles, and Calgary in North America, and in Colombia, South America. Worthington Corporation, Harrison, N. J. In Canada: Worthington (Canada) Ltd., Brantford, Ontario. 43-5

WORTHINGTON

NOW

A CRESCENT FLANGE TREE



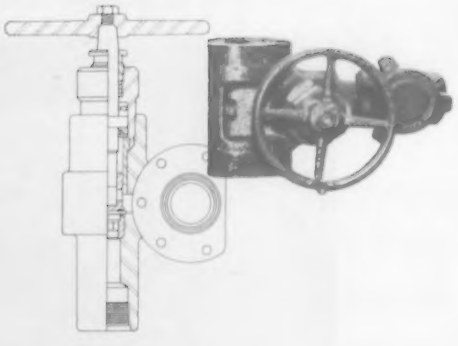
with the time-proven J-E flow control

The O-C-T Crescent Flange Tree offers unmatched flexibility, simplicity and economy in that one valve in the dual hookup can be removed without disturbing the other.

Now, O-C-T offers the CRESCENT FLOW CONTROL. It features all advantages of the **time-proven J-E Flow Control** AND has individual crescent flanges for dual trees.

Thus, the Crescent Flange Tree has new compactness and economy. Further elimination of connections guarantees leak-proof operation.

If there is a dual in your future, you will profit by talking to an O-C-T representative.



where progress is a daily practice

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OIL CENTER TOOL CO.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

Address Export Inquiries for All Countries to
P. O. Box 3091, Houston, Texas.

from
Tuboscope research . . .

NEW SONOSCOPE® USED TUBING INSPECTION

Quickly selects usable tubing . . . cuts production costs . . . increases profits

The Tuboscope Company announces an important advance in used tubing inspection technique: SONOSCOPE Used Tubing Inspection makes positive selection of serviceable oil country tubing. Each joint is classified for maximum serviceability.

100% INSPECTION OF TUBING WALL—The new SONOSCOPE Inspection electronically detects even minute corrosive pitting. Every square inch of the tubing body wall is inspected. The inspection may be performed during a workover with minimum lost rig time, because new SONOSCOPE Inspections are much faster than old-fashioned methods.

SONOSCOPE Used Tubing Inspections are performed by the Tuboscope Company only.

TUBOSCOPE®

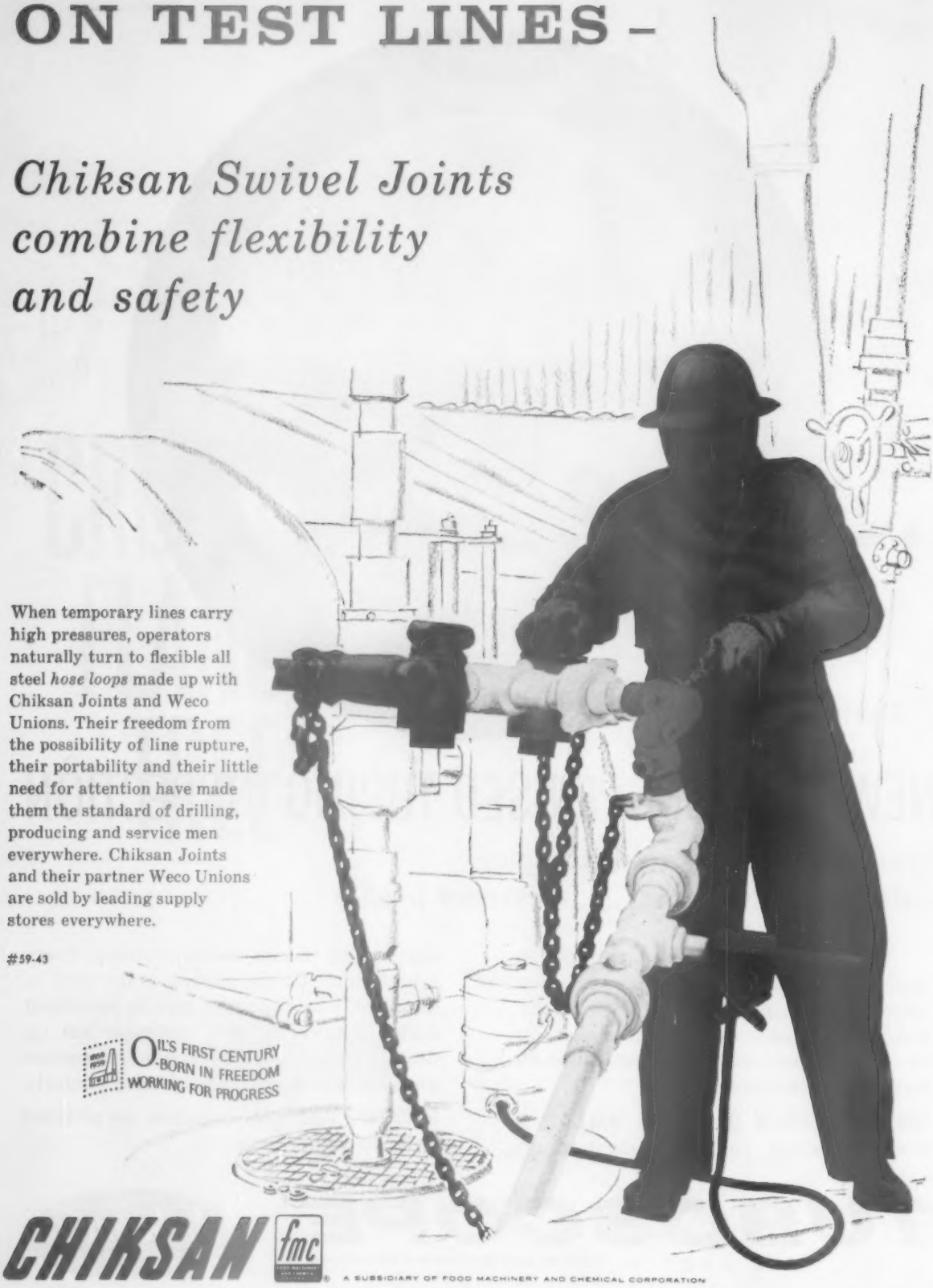
®Trade and Service Marks Registered U.S. and Canada

Tuboscope COMPANY

NEW AND USED DRILL PIPE AND TUBING INSPECTION . . . TUBE-TECTOR® RUBBER DRILL PIPE PROTECTORS 2919 Holmes Road Houston, Texas

ON TEST LINES –

Chiksan Swivel Joints combine flexibility and safety



When temporary lines carry high pressures, operators naturally turn to flexible all steel *hose loops* made up with Chiksan Joints and Weco Unions. Their freedom from the possibility of line rupture, their portability and their little need for attention have made them the standard of drilling, producing and service men everywhere. Chiksan Joints and their partner Weco Unions are sold by leading supply stores everywhere.

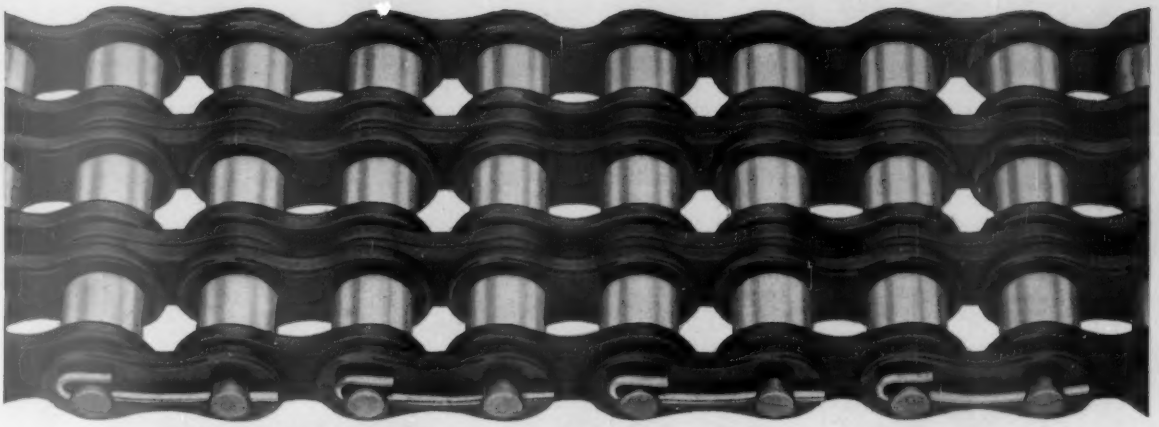
#59-43

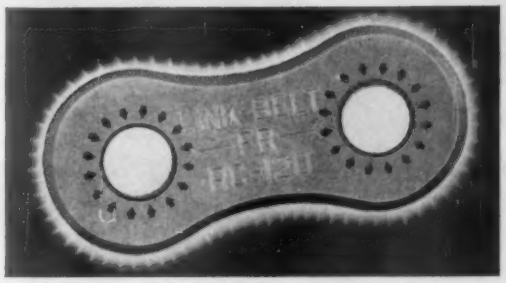
OIL'S FIRST CENTURY
BORN IN FREEDOM
WORKING FOR PROGRESS

CHIKSAN fmc

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

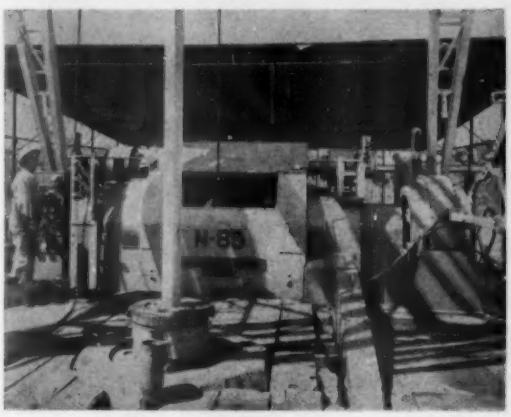
CHIKSAN COMPANY—Brea, Calif. • Chicago 5, Ill. • Newark 2, N. J. • Weco (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Co. • Chiksan of Canada Ltd.





Arrows indicate critical areas treated with compressive stresses to improve fatigue resistance.

Fortified against fatigue



BREWSTER N-85 DRAWWORKS is equipped with Link-Belt multiple-strand precision steel roller chain with "FR."

LINK-BELT FR® oil field roller chain stands up to tremendous stresses of modern drilling service

The smashing impacts and tortuous stresses met in day-to-day drilling are taken in stride by Link-Belt FR (Fatigue Resistant) roller chain. Through its patented FR process, Link-Belt gives its roller chain *greater dynamic strength*. FR greatly raises the chain's endurance limit by compressing metal around pitch holes—the critical sidebar areas most vulnerable to fatigue failure.

The FR process results from the same design and metallurgical research that has produced many more "extras," all *standard* in Link-Belt oil field roller chains. They include shot-peened rollers, close heat-treat control, Shepherd's Crook Cotters and others. For details, see Catalog 2880. 15,300

LINK-BELT

ROLLER CHAINS AND SPROCKETS

CATALOG 2880 has full information on all Link-Belt oil field equipment. You can obtain a copy from any leading supply store in the field. Also in Composite Catalog of Oil Field Equipment.

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 26, Odessa, Tex., New Orleans 6, Shreveport, La., Los Angeles 22 (Montebello), Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.

WASTE HEAT FROM STACKS LIKE THESE COULD PAY 1/5 OF YOUR FUEL BILL

A Ljungstrom® air preheater can cut 20% off your fuel bill by getting more heat from your fuel. That means you burn less of your regular fuel to get the same operating temperature, or you can switch to cheaper fuels without affecting product quality. Either way, every barrel of output can cost 20% less in fuel.

A Ljungstrom air preheater gets more productive heat from any fuel by boosting the temperature of the combustion air – sometimes as much as 1000F. Fuel burns more completely in preheated combustion air, and leaves less slag and deposit behind, so the fuel-burning equipment stays efficient longer.

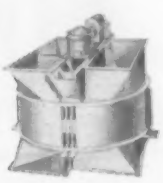
How fast is "WRITE OFF"?

What you save on fuel can pay for the Ljungstrom in two years. If you take advantage of the extra capacity of a Ljungstrom-equipped system to increase output or to improve product quality, the Ljungstrom can pay for itself within nine months.

Write today for your copy of a factual article by Mr. O. F. Campbell of Sinclair Refining Company, describing one company's fuel savings with a Ljungstrom air preheater. Call or write The Air Preheater Corporation.

Wherever You Burn Fuel, You Need Ljungstrom

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves, the heat is transferred from the waste gases to the incoming cold air.



The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

cost-cutting gas boosters

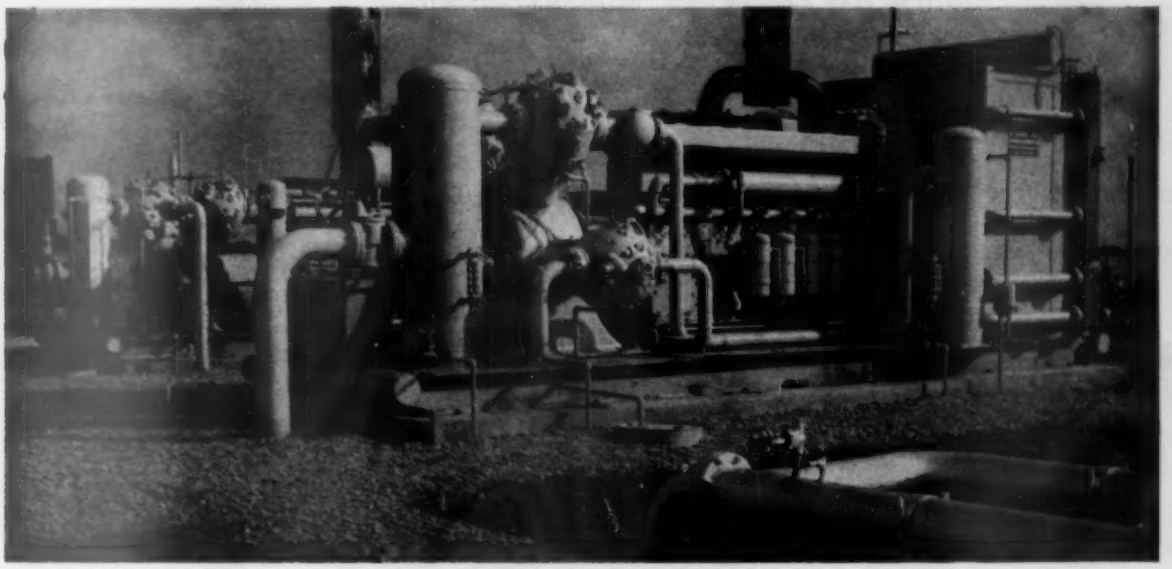
In a recent 12-month period, Sunray Mid-Continent Oil Company installed 11 "packaged" gas compressors, each dependably powered by a White Superior gas engine. Every day 4050 HP from the Superiors drives compressors that deliver 37,475,000 cubic feet of gas for Sunray's expanding gathering program!

Throughout gas and oil fields, rugged, compact Superior engines are proving economical, both in purchase price and operating costs. For example, because of the ability of Superior engines to deliver required HP at low speeds, the engines are directly coupled in engine-compressor packages. This eliminates the need for expensive gear reducers, results in smooth continuous performance and low fuel consumption.

Superiors' extreme design simplicity, precision construction and many advanced engineering refinements reduce maintenance and repair and greatly prolong engine life.

Superior engines are available in diesel, dual-fuel and gas engines from 190 to 2150 HP and in portable or stationary generator sets from 150 to 1500 KW. Get complete information from leading oil field distributors, White oil field representatives, or through White Diesel Engine Division.

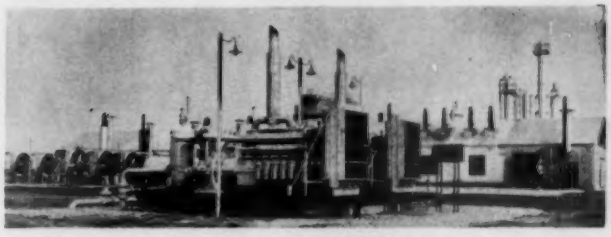
Sunray Mid-Continent expansion program includes 11 new Superior-powered compressors



Superior ENGINES ATLAS Imperial DIESEL ENGINES White DIESEL

White Diesel

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
Plant and General Offices: Springfield, Ohio



Superior 8G-825 eight-cylinder gas engines driving gas boosters at Sunray's West Moore Field, Cleveland County, Oklahoma.

IF YOU HAVEN'T SEEN THE FRANKS *Explorer* IT'S NEW TO YOU!

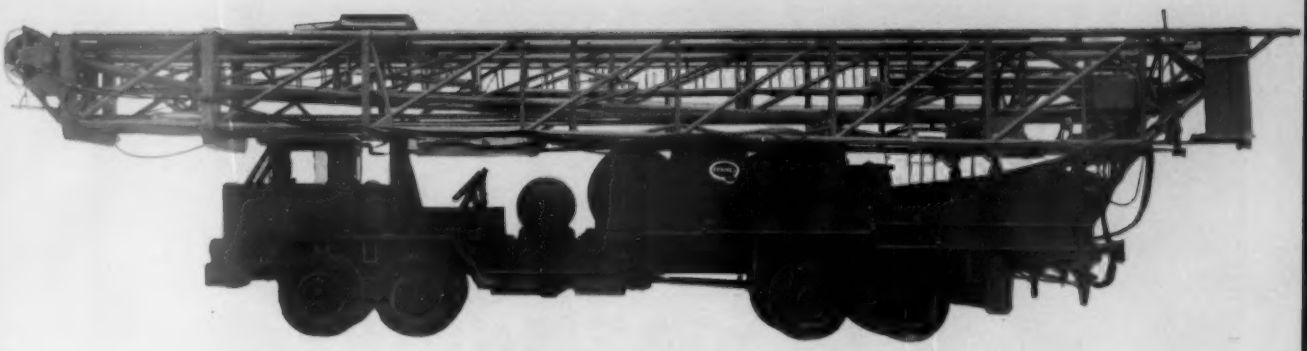
NOW OUTSELLING ALL COMPETITION SINCE ITS RECENT INTRODUCTION

FRANKS *Explorer Rocket*

FRANKS *Explorer Cruiser*

FAMOUS FRANKS FEATURES

24-hour service — Wheels to crown
27 years experience goes into Explorer
Explorers to fit any well depth
Industrial engines
Less maintenance
Explorers get on the job faster
Explorers service wells faster
No Federal excise tax
Explorers — Rated off highway, most states
Factory Service All Over The World



FRANKS
DESIGN FEATURES

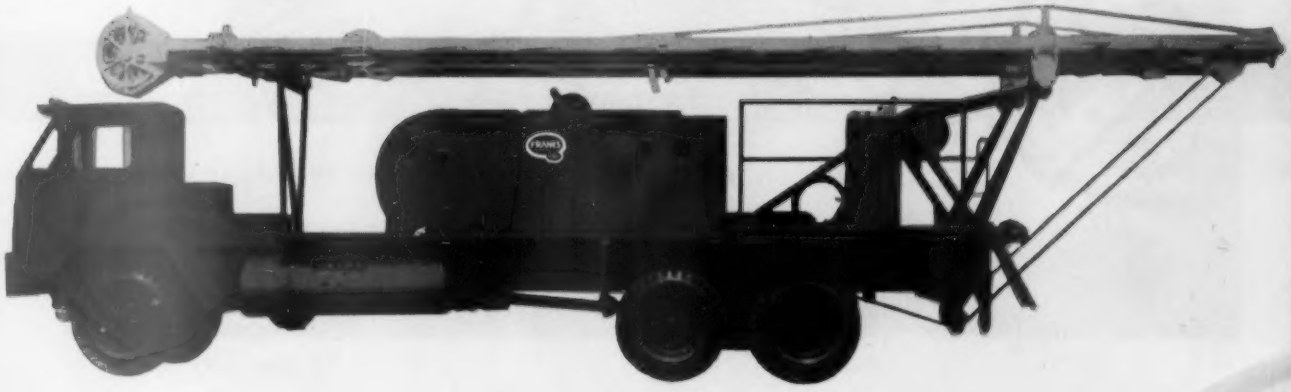
No sag — No bend frame
Safe front and rear rocker beam axle suspension
No heating engines
Servicing and workover on deepest wells
Derricks — True rated capacity 100,000# to 275,000#
Removable sand reel for lighter weight
New full view control console
Full view low silhouette drum guards
We predict Explorers to have higher used resale value than other models

WELL SERVICING AND DRILLING UNITS
FRANKS
DIVISION OF
CABOT
PAMPA, TEXAS

Factory Service All Over The World

PROFIT MAKING FEATURES

Explorer Cruiser big power
Explorer Cruiser to match every job
Explorer Cruiser — Single or double pole mast
No sag — No bend frame
Franks proven full air clutch
Unexcelled drum brakes
New drums designed to take it, no spread flanges
New full view control console — safer

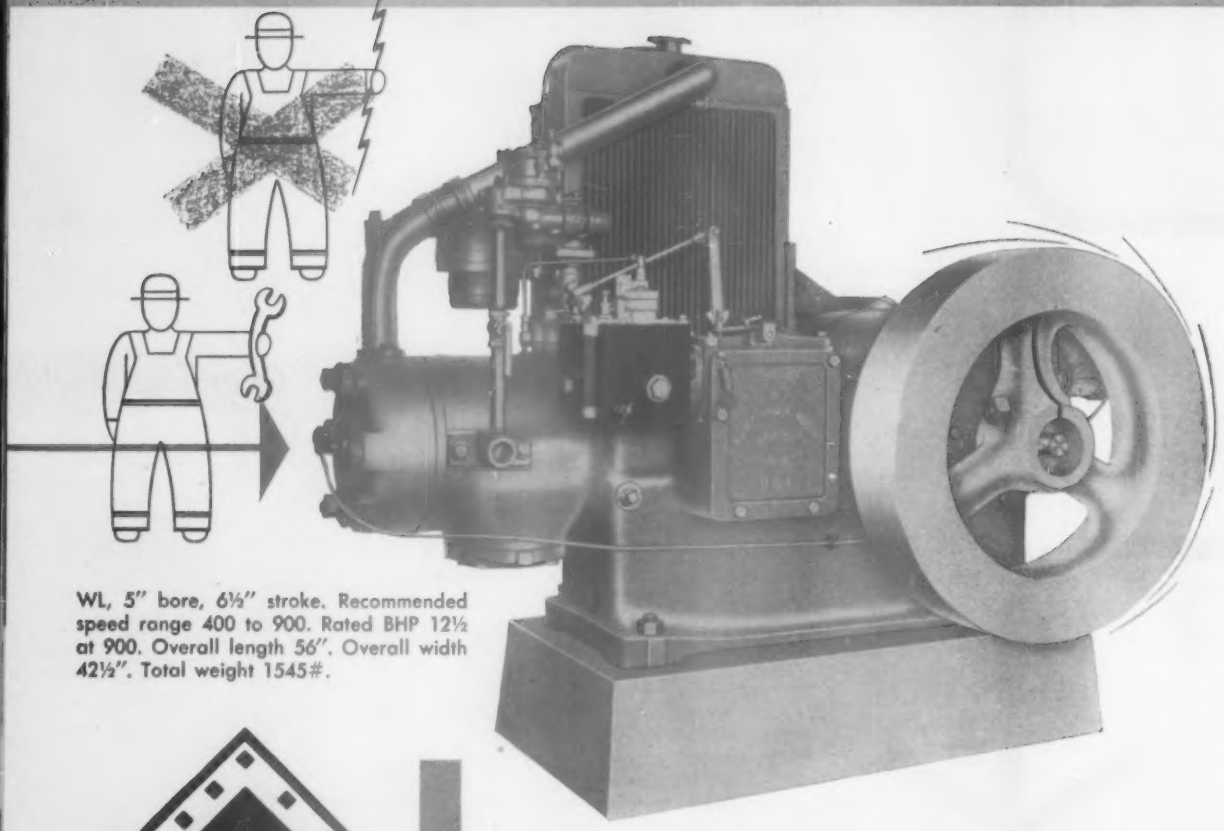


Why two men to do one man's job?

with Electrified Equipment { 1-ELECTRICIAN / 2-MECHANIC

with AJAX GAS ENGINE

You need Only the **MECHANIC**

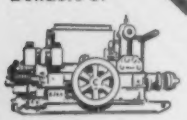


WL, 5" bore, 6½" stroke. Recommended speed range 400 to 900. Rated BHP 12½ at 900. Overall length 56". Overall width 42½". Total weight 1545#.

AJAX ENGINES

AJAX GAS AND OIL ENGINES

AJAX also builders of



Compressors

Pressure Pumps

AJAX IRON WORKS CORRY, PENNSYLVANIA

OIL FIELD DISTRIBUTORS

- The National Supply Company, Pittsburgh, Pa.
- Bethlehem Steel Company—Supply Division, Tulsa, Okla.

New AN AUTOMATIC, COMPACT **LimiTorque**

...FOR OPERATING YOUR

Plug Valves

...IN 8 TO 16 SECONDS

LimiTorque LINEAR MOTORIZED VALVE OPERATOR

...a dependable time, labor and money saver

Another LimiTorque *first* — here's the answer to the problem of motorizing your wrench (hand) operated Plug Valves . . . a simple, easily installed unit that can be built either to NEMA IV (weather-proof), or NEMA VII (explosion-proof) standards . . . an inexpensive, sturdy, fully reliable and extremely compact assembly that requires no gear changes or modifications, other than to supply a motor with the proper output speed. The *LimiTorque Linear Operator* consists of motor and double reduction gearing which drive a traveling screw and a crank that is easily mounted to the square shank of plug valve.

As noted in the illustrations, the entire assembly can be readily adapted to your plug valve while in service, by merely mounting the crank on the plug shank and strapping the support bracket to the pipe . . . The *Linear Operator* is supplied with all necessary adapting parts such as the support bracket and straps for mounting on the pipeline; also the necessary crank arm for mounting on the square shank of valve plug — The entire construction and operation is indeed simple . . . and the purchase price and installation costs are comparatively low.

A torque of 175# is developed at the valve, which is normally more than enough to drive most wrench-operated plug valves up to 6" in size. If power fails, or manual operation is desired, the mere removal of a pin (which connects the traveling screw to the crank arm) will divorce the crank from the *Linear Operator* assembly — and a bar placed in the bushed bore of the crank arm will operate the valve. (No special wrench is needed.) The mere flick of a switch to the direction of travel desired will operate the valve . . . Contact your valve manufacturer, or your nearest LimiTorque Sales Engineering Office.

Full details on this *new LimiTorque Linear Operator* are contained in Bulletin 20-58 . . . send for copy on your business letterhead.

THERE IS NO SUBSTITUTE FOR —

LimiTorque®

PHILADELPHIA GEAR CORPORATION

ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.

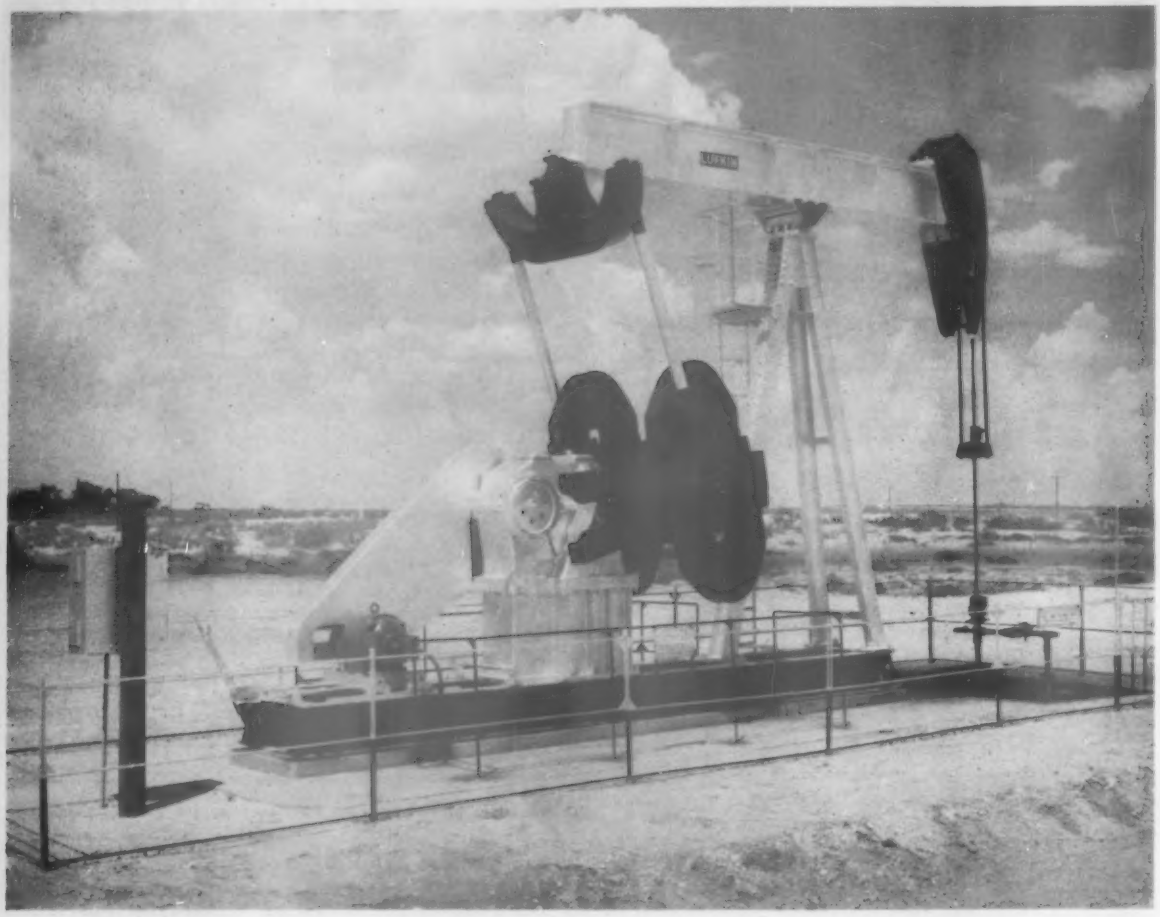
Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS
LIMITORQUE VALVE CONTROLS
FLUID AGITATORS • FLEXIBLE COUPLINGS

Limitorque Corporation • Philadelphia

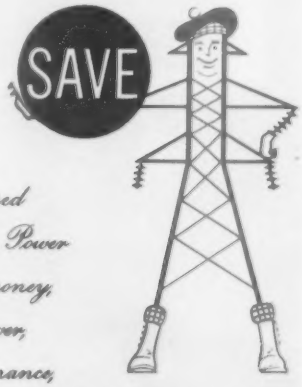
You can depend on purchased electric power for

ECONOMICAL OPERATION



Producing well in West Texas using low cost purchased power and automatic control

Producing fields that use utility electric power give the utmost in operating economy . . . this is one of the thousands of wells producing as required with lowest possible operating cost. If you want more from your production, gathering, pipelines or refineries . . . use and *depend* on purchased electric power. Call your nearest utility electric power company for details.



Purchased Electric Power saves money, manpower, maintenance, and serves you better automatically

Petroleum Electric Power Association

P. O. BOX 35006, DALLAS 35, TEXAS

SAVINGS and SERVICE GO HAND-IN-HAND WHEN YOU STANDARDIZE WITH

WECO

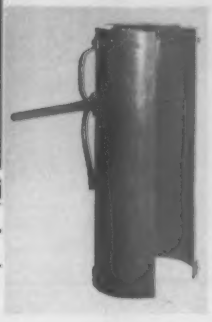
SAVINGS are a built-in advantage of WECO Unions. You save valuable time when rigging-up . . . when piping-up for production or hooking-up for service operations. You save on costs because you get longer service on the toughest jobs with WECO Unions. Positive, dependable sealing eliminates costly repairs or replacement.

SERVICE is the advantage provided by your Supply Store, which stocks WECO Unions for your convenience. They have them ready and available in the size and pressure rating you need, when you need them.

Cut costs of your drilling, production and service operations by taking advantage of the savings and service provided when you STANDARDIZE WITH WECO.

WEC

WECO TUBING WE



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WECO AIR-O-UNIONS on
time. With the union we
inflated with a shot of
make-up and seal the WE

WECO

CO UNIONS CUT COSTS

WET BOX

and easy to handle, Wet Box clamps d the tubing joint prevents fluid from ing over the work endangering the of the crew. It is handled, manually fully opened and closed by a single ting handle. One can be used for all g sizes by changing ubber seal in the f the box.

...ON DRILLING RIGS

With WECO Unions on your blow-out preventer hookups . . . mud lines, stand pipe . . . water, air, fuel and steam lines, rig piping can be made-up and broken-out in the shortest possible time.

...ON PRODUCTION HOOKUPS

WECO Unions simplify piping lay-out, and speed-up installation of flow lines . . . headers and manifolds . . . heaters, treaters and separators . . . metering station hookups.

...IN SERVICE OPERATIONS

WECO Unions are unexcelled for dependable, leak-proof connections on suction and discharge lines, manifolds and heads, for cementing, acidizing and fracturing services.

THE WECO AIR-O-UNION

PAT. PEND.

on mud tanks and suction lines save hours of rig-up welded in place, pipe is slipped into it and the tube of air . . . no bolts, nuts, wrenches are required to WECO AIR-O-UNION. Sizes 6" through 16".

WECO CLEANOUT GATE

Quickly and easily installed, the Cleanout Gate provides a large rectangular opening for emptying and cleaning tanks. It can be installed inside or outside of wood or metal, round or rectangular tanks or vats. The frame is bolted or welded to the tank and sealed with a Neoprene Gasket. A synthetic rubber ring seals the gate and frame opening. A cam on the operating handle forces the gate into sealing position with the frame.

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY a subsidiary of FOOD MACHINERY AND CHEMICAL CORPORATION

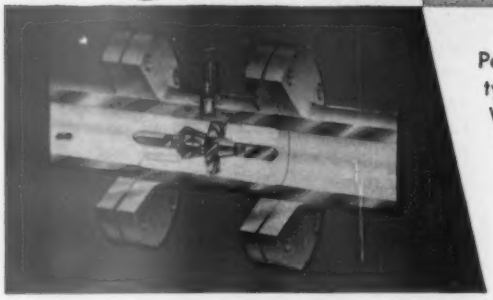
U-3-59

WECO UNIONS
CHIKSAN JOINTS
WECO
UNIONS
ES

ELECTRONIC, TURBINE-TYPE POTTERMETERS SERVE INDUSTRY APPLICATIONS RANGING FROM

0.1 g.p.m. to 60,000 b.p.h. or more

Cost? *LOWEST FIRST COST... LOWEST UPKEEP!*



Pottermeter utilizes a hydraulic principle to suspend its turbine-type rotor in an axial "floating" position. No thrust bearing. Without thrust friction, the rotor responds instantly without slippage at a spin-rate governed by, and accurately proportional to, the velocity through the pipe. An Alnico magnet in the rotor produces an electric signal which operates readout or control equipment as required for indication, recording or automation. Compared to positive displacement meters, relative simplicity, freedom from wear and smaller size cuts costs, especially for higher capacity requirements.

Potter-Bowser engineers gladly confer with petroleum system engineers on invitation to provide detailed information on metering equipment to meet exact requirements.

CHECK THESE ADVANTAGES OF THE POTTERMETER

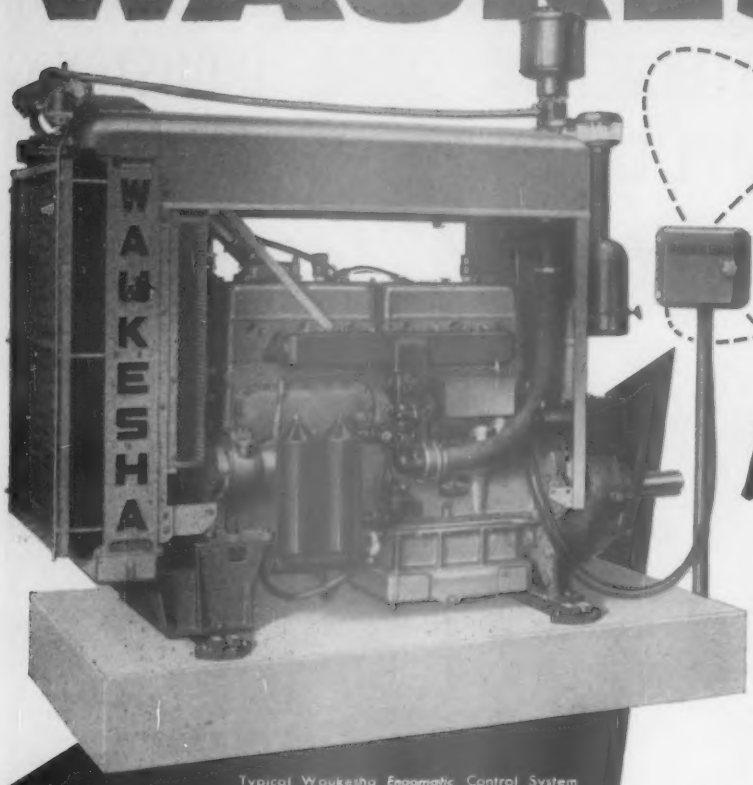
- ✓ 1 MOVING PART
- ✓ PRESSURES, Unlimited
- ✓ TEMPERATURES, —455°F. to +1500°F.
- ✓ STANDARD CONSTRUCTION, Type 316 stainless steel
- ✓ ELECTRONIC READOUT EQUIPMENT, To specifications
- ✓ FRICTIONAL RESISTANCE, Virtually nil
- ✓ STOP-START, Instantaneous
- ✓ ACCURACY, Unexcelled

pottermeter

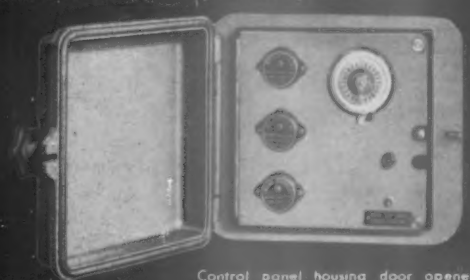
PETROLEUM ENGINEERS:
Contact Potter-Bowser Division at address below for prompt information and data service.

BOWSER MARKETING DIVISION
1300 EAST CREIGHTON AVE.
FORT WAYNE, INDIANA

WAUKESHA



Typical Waukesha *Engomatic* Control System Installation on a Waukesha Long-Life Oil Field Unit. Note control panel can be mounted in any convenient position



Control panel housing door opened, showing heavy cast construction, dust and moisture proof seal, starting reset, and time-cycle controls for an *Engomatic* pumping control installation.

Panel open, showing wiring harness, sealed relays and other electrical components, all of highest quality, and designed for long life and easy replacement.

423

Engomatic POWER CONTROL SYSTEM

The Waukesha *Engomatic* Control System meets the demand for internal combustion engine automation. All operation is independent of outside power. It is fully protected with safety shutdown devices and has visual indicators and manual resets, and functions with engines using all standard fuels. Operation can be controlled on a time-cycle basis; by remote control; liquid levels or temperatures; or by any signal peculiar to the equipment involved. Send for Bulletin 1731.

FEATURES OF WAUKESHA POWER CONTROL

Automatic Start-Stop by Time-Cycle, or Remote Switch • Fused Control Circuits • Three Position Selector Switch for Automatic or Manual Operation • Intermittent Cranking • Low Oil Pressure and High Temperature Protection • Overcrank Protection • Engine Warm-up Period • Automatic Clutch Engagement—single or repeated for heavy load starting • Automatic Clutch Disengagement when engine stops • Dustproof enclosed plug-in type Relays • Waterproof, Dustproof Control Enclosure.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / New York • Tulsa • Los Angeles
Factories: Waukesha, Wisconsin and Clinton, Iowa

WORLD'S RECORD MILLING JOB!

Servco Pilot Mills chew up 1138′ of 9-5/8″, 53-50 casing at an average milling rate of *4′ per hour!*

Servco Pilot Mills were put to work milling stuck casing after cut-and-pull operations had been tried with poor results. The complete milling job involved 907′ of 9⅝″, 53-50#, N-80 casing, 231′ of 9⅝″, 53-50#, P-110 casing, 7 centralizers and 1 float collar. In all, more than 61,000 pounds of shavings were produced.

These astonishing results were possible because of the use of Servcoloy*—a new, patented hard-facing material that has completely changed thinking about downhole milling. Servcoloy suspends hundreds of carbide chunks in a tough, elastic matrix which acts as a shock absorber—overcoming carbide's inherent sensitivity to shock and permitting its superior cutting quality to be utilized fully. As cutting edges are dulled or torn from the matrix, new edges are automatically exposed. Hundreds of fresh cutting edges are continuously at work, enabling remedial work which formerly took days to do to be done in hours.

Why not put these proven tools to work on your next milling job? Your nearest Servco office will give you complete details.

*PATENT NO. 2,833,638

CAN YOUR PRESENT MILLING METHOD MATCH THESE SERVCOLOY RESULTS?

Csg. Wt. & Grade	Total Footage Milled	Milling Hrs.	Time Min.	Ave. Footage Milled Per Hr.	No. Mills Req'd.	Depths
7⅝" 33.70# N-80	110.5*	53	05	2.1	4	Below 12,500′
7⅝" 29.70# N-80	103**	28	07	3.6	2	Below 13,000′
7" 26# N-80	82	14	40	5.8	2	Below 10,000′
7" 26# N-80	202***	18	48	10.6	2	Below 14,000′

*Includes milling bottom half of safety joint and cross over bushing.
**22° angle directional hole.
***Includes milling rotary shoe.

Actual job records and other information will be sent upon request.

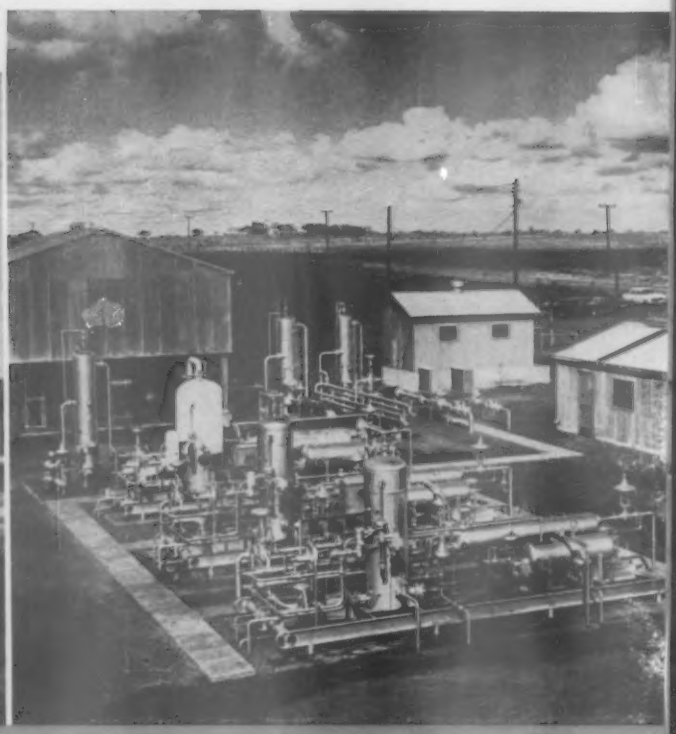
SERVCO

General Offices: 2440 Cerritos Avenue, Long Beach 6, California

Mid-Continent and Gulf Coast: 4850 Gasmer St., Houston 35, Texas

Field Offices: Ventura, Bakersfield, Lafayette, Harvey, Oklahoma City
Canada: 6909-104th Street, Edmonton, Alberta
Venezuela: Maracaibo

THE SERVCO COMPANY



Four Ways to Efficient Hydrocarbon Recovery With

BS&B COLD-FRAC with Conventional Low Temperature Separation . . . Here's one of two units that efficiently handles a difficult waxing problem at a rate of 10 MMSCPD. The conventional COLD-FRAC unit is especially suited for (1) wells having a wellhead pressure of 3,000 psi or more, (2) wells producing wax and/or salt water, and (3) wells having a pressure life of three to five years. Available in a wide range of standard sizes.

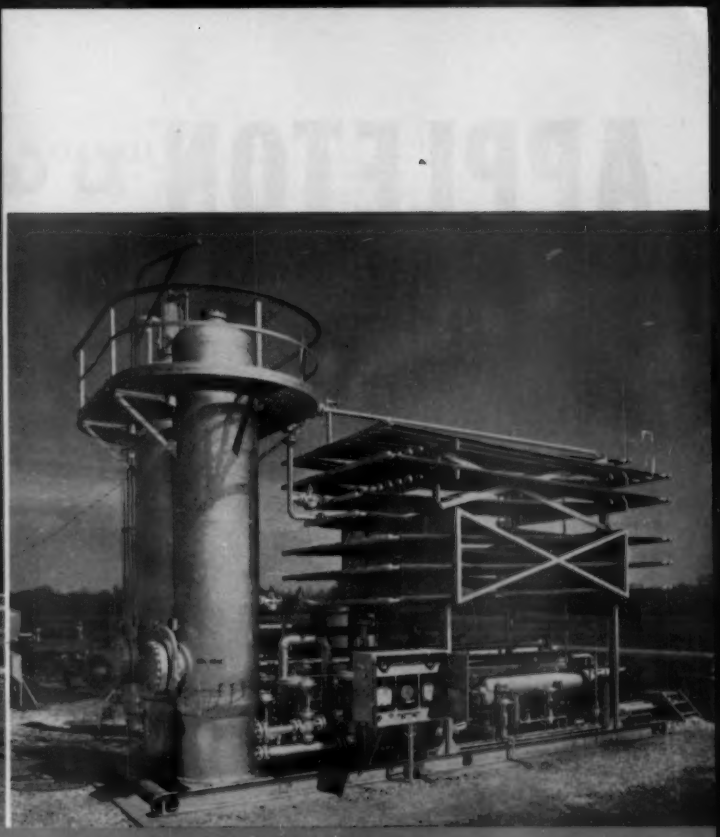
BS&B COLD-FRAC with Glycol Injection . . . A 22% increase in condensate recovery was achieved by these three units having a stage separation capacity totaling 40 MMSCFD. The installation handles the streams from ten wells. COLD-FRAC with glycol injection is designed for wells having an available pressure drop of 500 psi or greater where gas dehydration and hydrocarbon dewpoint control present a problem. Each unit is designed to produce a maximum volume of condensate while dehydrating processed gas to pipeline specifications.

Rich or lean . . . wet or dry . . . whatever the composition of your natural gas wellstreams . . . BS&B has the gas processing equipment that will give you maximum hydrocarbon recovery efficiently and economically.

BS&B offers the *complete* line of gas processing equipment . . . COLD-FRAC Low Temperature Separation Units, both Conventional and Glycol Injection types . . . Ammonia Absorption Refrigeration Units . . . DRY FRAC Hydrocarbon Recovery Units . . . Heat Exchangers . . . Stabilizers . . . Salt Bath Heaters . . . Glycol and Dry Desiccant Dehydrators . . . Desulfurizers.

BS&B gas processing specialists will study your wellstream analysis and give you objective recommendations on what type of equipment will process your natural gas production most economically.

BLACK, SIVALLS & BRYSON, INC.



Equipment Selected From BS&B's Complete Line

BS&B COLD-FRAC with Ammonia Absorption Refrigeration . . . This system with a 25-ton Ammonia Absorption Refrigeration unit was the solution to a production problem that boosted condensate recovery by 39% over standard separator test! The BS&B Ammonia Absorption Refrigeration unit, in which ammonia is continuously absorbed, distilled, condensed, evaporated, and reabsorbed, is designed for heavy duty continuous operation. It is completely automatic for unattended operation under widely fluctuating loads. The refrigeration unit is readily skid-mounted. Standard units are available up to 200 tons with larger units available on application.

BS&B DRY FRAC Hydrocarbon Recovery . . . This completely automatic skid-mounted unit, which is a special variation of standard BS&B Dry Desiccant Dehydration units, extends the principle of *adsorption* to hydrocarbon recovery where natural gas streams of moderate pressures are too lean to be processed economically by other means. The process accomplishes dehydration of sales gas to pipeline specification at the same time. DRY FRAC obtains hydrocarbon dewpoint control and the liquid recovered will pay out cost of installation.

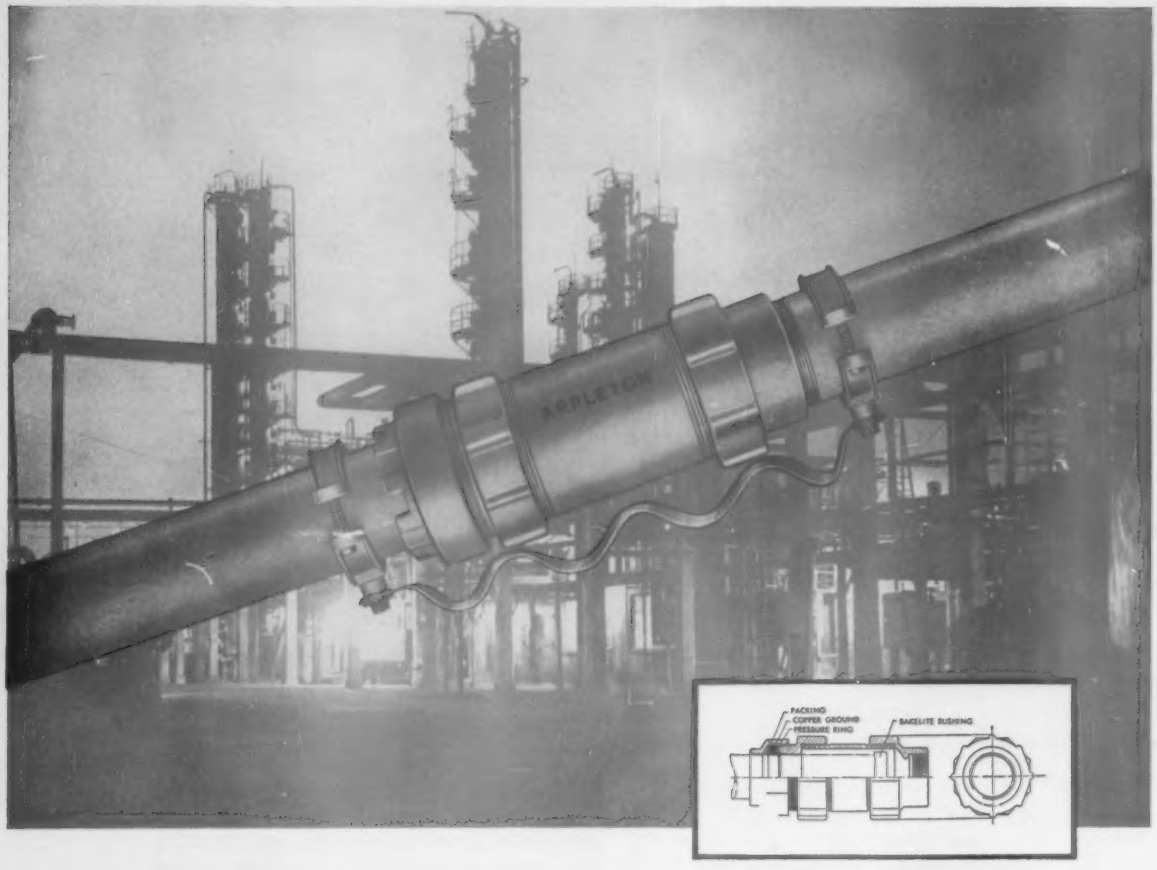
If you are planning to put new wells into production or want to improve your profit picture for present gas processing operations, call or write your nearest BS&B branch or sales office today.

BS&B

ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

DEPT. 1-A7A, P. O. BOX 1714, OKLAHOMA CITY

APPLETON® "XJ" Conduit Expansion Joints



Relieve the *strain* of expansion and contraction on long runs of rigid conduit

Temperature changes place a terrific strain on all long conduit runs. To relieve this potentially dangerous condition, it is best to install APPLETON "XJ" Expansion Joints at frequent intervals along the entire system. These weatherproof joints, for use with heavy-wall conduit, have a metallic packing and a bonding jumper to assure the entire conduit system remains a continuous electrical conductor. The jumper, installed in accordance with U. L. recommendations, gives double protection against extreme expansion movement reducing the effectiveness of the metallic bond.

As the conduit is inserted in the joint, a bushing is placed on the end in the manner shown. This bushing permits maximum conduit movement and yet the conduit can never pull free of the joint. The APPLETON "XJ" Conduit Expansion Joint features a metallic packing and pressure ring at the flexible end to keep the joint weatherproof at all times.

Wherever a long run conduit installation exists, the need for APPLETON "XJ" Expansion Joints exists. Interior or exterior, from Texas to Maine, temperature strains do exist, so take advantage of APPLETON'S product research program to give you the precision products you require . . . APPLETON "XJ" Weatherproof Expansion Joints for all long run conduit installations.

Sold Through Franchised Distributors Only

APPLETON ELECTRIC PRODUCTS

APPLETON ELECTRIC COMPANY

1701 Wellington Ave., Chicago 13

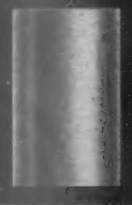
Also Manufacturers of:

Turn to TEX-TUBE

BOTH ENDS BEVELED

ONE END BEVELED

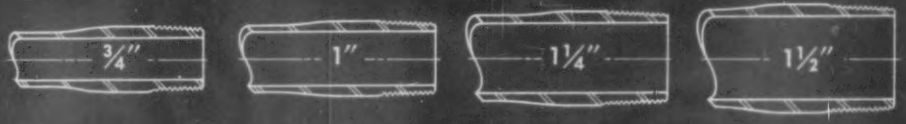
NON-BEVELED



SPECIAL CLEARANCE

NON-UPSET T & C

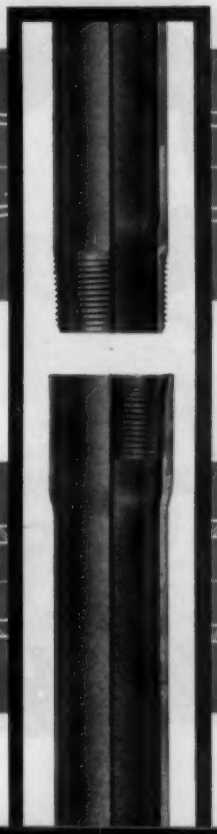
for Macaroni Tubing



API UPSET T & C

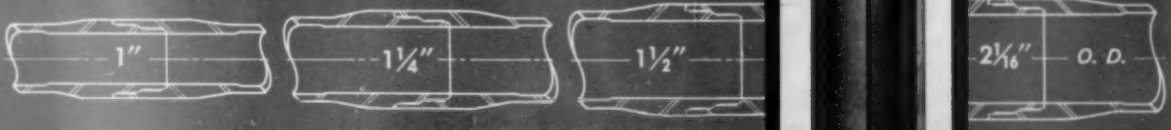
to your Exact Requirements

TEX-TUBE 10-RD THD INTEGRAL JOINT



TEX-TUBE, INC.

1503 NORTH POST OAK ROAD • HOUSTON, TEXAS



HEAVY DUTY HIGH PRESSURE INTEGRAL JOINT

Sales Offices in Midland, Texas—Tulsa, Oklahoma— Dallas, Texas—Los Angeles, California

TEX-TUBE INTEGRAL JOINT

ANOTHER Vogt FIRST

9 NEW FLANGED END FORGED STEEL

GENERAL GP PURPOSE

Gate, Globe and Check VALVES

with

HARD FACED SEATS
150, 300 and 600 ASA STANDARD

featuring:

ASA Standard flanges and face-to-face dimensions
*Stellite hard faced seats and hardened wedges and discs
Spiral wound body-bonnet gaskets
Stainless steel gland studs and nuts
Interchangeable parts
Light weight with maximum strength
Complete line—pressures, sizes and types

*Union Carbide Corp.

Write for Literature. Address Dept. SAA-570

Vogt GENERAL GP PURPOSE Vogt FOR BETTER VALVES

HENRY VOGT MACHINE CO., BOX 1918, LOUISVILLE 1, KY.
SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J.
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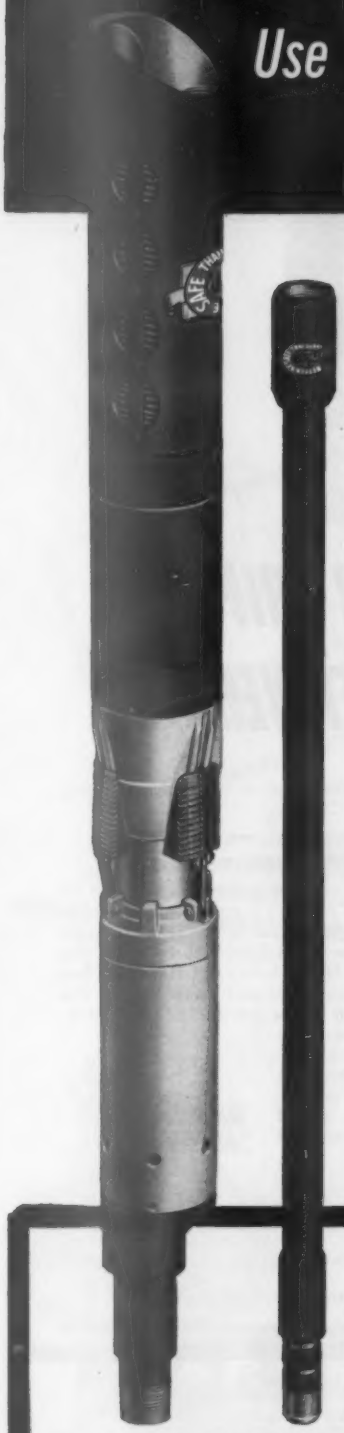
FORGED STEEL
VALVES

For Dual String Completions – Flowing or Pumping

Use GUIBERSON'S RETRIEVABLE TYPE RD PACKER



Type RD Packer with Anchor and Plain Stinger

This cleanly designed, rugged packer is an outstanding Guiberson development for dual string installations in wells of any depth.

Outstanding in performance because it operates perfectly with both zones flowing, high or low differential pressure; with either zone flowing, the other zone pumping; with both zones pumping; with either or both zones on gas lift; or for multi-zone injection — gas or water.

Outstanding in advantages because it completely isolates each zone from the other and from the casing; provides full opening long string to lower zone; permits either string to be pulled or run separately.

Guiberson's RD packer does complex dual zone jobs so well that operators tell us it's their best investment for dual string production. Ask your Guiberson representative about installation and auxiliary equipment recommendations.

Guiberson's RD packer has smooth operating dovetail slips of heat-treated alloy steel. Packing rubber is one-piece sleeve type — will not vulcanize in the well, made of Guiberson's special oil and gas resistant compound. You can get the RD packer with or without anchor, and a choice of stingers, plain or with snap-ring. Piston slips have extra large gripping area, are heat-treated alloy steel and keyed to anchor body up to maintain proper alignment. Get the Best — Get Guiberson.

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U.S.A.

Sold by Oil Field Supply Stores Everywhere

another
TRETOLITE SERVICE
report

BEFORE KONTOL! *Here's what a tube bundle looked like in one of the heat exchangers of an Ohio refinery — after just 94 days of service. A* KONTOL *Protection Program has since trebled tube life, upped heat exchange efficiency by more than six million BTU's per hour!*

KONTOL* CORROSION INHIBITOR TRIPLES TUBE-BUNDLE LIFE AT OHIO REFINERY

Also saves $96.00 per day on increased BTU's ... The effectiveness of KONTOL* protection against corrosion and fouling in tube bundles was dramatically demonstrated in the heat exchange equipment of the crude unit at a large refinery in Ohio.

Since the inauguration of a regular KONTOL Corrosion Inhibitor program, the tube bundle life period has been increased by approximately 3 times the bundle life prior to the use of KONTOL.

KONTOL'S DETERGENT ACTION ADDS DOLLAR-BONUS TO OPERATION

The detergent action of KONTOL Corrosion Inhibitor provided a *plus* benefit for the refinery. A cleaner operation has resulted in the gain of an additional 6,000,000 BTU's per hour—or a savings of about $96.00 per day.

THERE'S A KONTOL PRODUCT FOR YOUR CORROSION PROBLEM

The KONTOL product used in this case was based on a careful study of the refinery's specific needs. The Tretolite Company developed and pioneered the application of organic corrosion inhibitors throughout the petroleum industry. No other organization has Tretolite's wealth of experience and know-how in the manufacture and use of these products. This background (Tretolite corrosion engineers, laboratory and research facilities) is always available to you—to help solve your particular corrosion problems. A call will bring you this service—at no obligation.

*KONTOL *is a registered trademark of Petrolite Corporation.*

KR-59-1

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CORPORATION

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5531 Telegraph Road, Los Angeles 22, California

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ENGLAND: Petrolite Limited, 46 Mount Street, London W. 1.

VENEZUELA: South American Petrolite Corporation, Hotel Avila, Caracas

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ANOTHER
PARKERSBURG
OUTSTANDING
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PARKERSBURG SUPER-DRYER

GLYCOL DEHYDRATOR

OFFERS LOW INITIAL COST . . .

LOWER OPERATING COST . . .

PRODUCES DRYER GAS!

The Parkersburg Super-Dryer offers many outstanding advantages over competitive-type units. Maximum economy is one factor. Higher dew-point depression is another . . . yet it has a smaller glycol circulation rate with lower reboiler temperature. Also, the glycol regenerator with the super-dryer **removes twice the water** from the glycol as standard types. Specify a Parkersburg Super-Dryer . . . your decision is backed by Parkersburg's **proven performance.**

THE PARKERSBURG RIG & REEL CO.
QUALITY PARKERSBURG WEST VIRGINIA SERVICE
MADE IN U.S.A.

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PARKERSBURG • HOUSTON • TULSA

See Your
PARKERSBURG
Representative
Today

"Our Chevrolet tandem gives us top economy and dependability, on or off the road!"

—LLOYD KIRK, VICE PRESIDENT
MOHAWK PETROLEUM COMPANY
TULSA, OKLAHOMA

No job's too tough

"Our Chevrolet tandem truck, Series 100, is doing a fine job. We especially like its ability to give us top economy and dependability on and off the highway. We started as a crude oil purchaser with only two units but we are now operating in Kansas, Oklahoma and Texas with fifty-five units.

"In this business we must give dependable service in all kinds of weather and our units must be able to get through to the leases and haul heavy loads at reasonable cost. Regardless of the lack of roads, we have to get our customer's oil before the tanks overfill, so we are running on tight schedules constantly.

"This tandem model has established its position in our fleet as an economical work-wise rig, and we are looking forward to a long and profitable life for it. We are well pleased with the performance of our Chevrolet trucks."

Men like Mr. Kirk make stern demands on a truck; the rig that wins their approval is the one that turns in the best record for tough, efficient, low-cost performance. And Chevy, you'll find, is winning a lot of new boosters among oil haulers, for a number of good reasons.

Reasons such as the big 230-h.p. Workmaster V8 that powers Chevrolet Series 90 and 100 trucks. In tough service the country over, this engine is delivering plenty of proof that it's just about the best yet for big-tonnage hauls. Its high torque (335 ft.-lbs.) gives you plow-horse pulling ability at low speeds and assures the power to keep mammoth loads moving briskly, right on schedule. Its advanced Wedge-Head design and short piston stroke help keep operating costs *low* . . . and its durable features, such as Moraine-400 bearings and Rotocoil exhaust valve rotors, help chop upkeep expense.

This Chevy powerplant is one sure answer to extra savings, and so is the tough chassis that leads to low maintenance with components specially designed for the capacity to outmuscle the roughest kind of runs. For the *latest* in low-cost hauling equipment, see your Chevy dealer! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

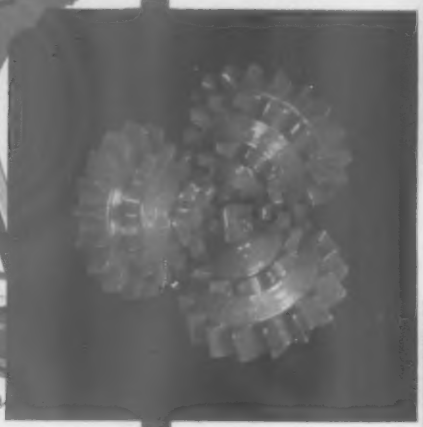
for a Chevrolet Truck

CHEVROLET

For Medium Formation Drilling...

specify SECURITY "M" SERIES Bits

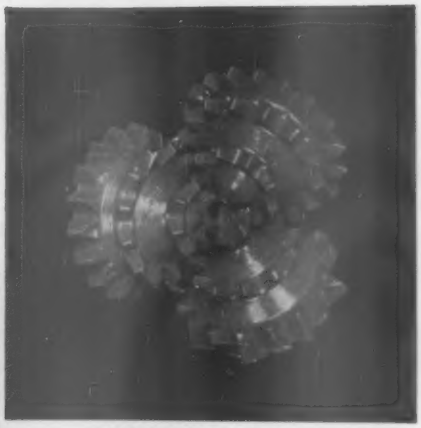
404 TYPES, SIZES and VARIATIONS



M4N

FORMATION RATINGS: For shale, lime, sand, shaley lime, and other medium to medium hard formations.

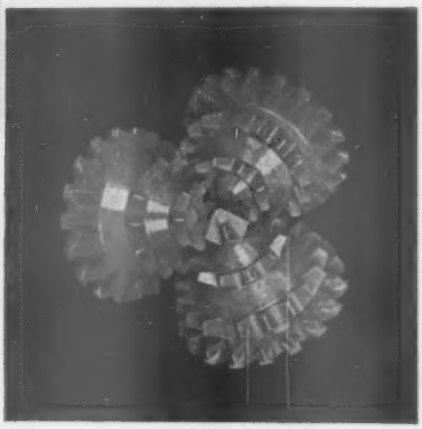
SIZES: 23 bit sizes from 5⅝ inches to 12¼ inches



M4

FORMATION RATINGS: For hard lime, hard shale, hard sands, anhydrite, dolomite, and other medium hard to hard formations.

Sizes: 23 bit sizes from 5⅝ inches to 12¼ inches



M4L

FORMATION RATINGS: For medium hard-abrasive to hard formations where hard lime, dolomite, and chert streaks predominate.

SIZES: 18 bit sizes from 6¼ inches to 15 inches

SECURITY manufactures a complete line of rock bits — more than 1120 types, sizes, and variations; 404 made exclusively for MEDIUM FORMATION drilling.

Like all Security bits, the "M" SERIES *medium formation* bits are offered in regular, jet, air, or jet-air circulation. For full details, write for Security's 1959 catalog.

Specify Security and get the RIGHT bits for every well you drill. Security bits assure fastest penetration, maximum footage, and greatest drilling economy.

Security

PRECISION BITS SINCE 1931

Available Through Your Favorite Accredited Supply Store

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OIL INDUSTRY'S NEWEST MONEY MAKER *

HAMONDFLOTE COVE

HAMONDFLOTE COVER

the practical—economical—guaranteed

FLOATING ROOF

for small diameter tanks used in marketing, bulk storage, producing and processing operations.

Write today for Bulletin 59HC.

* EARNS $775 per tank per year on $450 investment

HAMONDFLOTE COVER PAYS FOR ITSELF IN MONTHS ... builds profits by preventing evaporation, conserves product quality, retards tank corrosion... is low cost, maintenance free, unsinkable, virtually indestructible... easily installed ... longlife expectancy *(more than 10 years)*.

Constructed of rigid Polyisocyanate foam, a plastic material, the Hamondflote Cover is recommended for storage of Gasolines, Crude Oils and many liquid chemicals.

ONE USER REPORTS:

"The savings were apparent a week after it was installed and I highly recommend the Hamondflote Cover for all products, especially gasoline."

* *From the article, "Evaporation Loss Breakthrough," appearing in the April issue of Petroleum Marketer.*

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PROVO, UTAH • CASPER, WYO. • BIRMINGHAM, ALA.

ANNOUNCING the new AMERICAN MARC NATURAL GAS ENGINE

American MARC proudly offers the GAC-2, a rugged new air cooled natural gas engine. Precision manufactured to the exacting requirements of the Petroleum Industry, this American made engine delivers 14 BHP maximum at 2000 RPM . . . ideal for shallow well pumping and many other oil field applications. A modified version of the powerful, field-proven American MARC AC-2 diesel engine, the GAC-2 incorporates the same sturdy, heavy-duty diesel construction . . . the same dependable, trouble-free performance.

GAC-2 construction features include: Heavy-duty drop forged crankshaft, connecting rods and cam shaft; Stellite valves and valve inserts; Rugged Timken tapered roller main bearings; Large cam shaft and alloy steel crankshaft timing gears; Pressure deluge lubrication system; Aluminum alloy crankcase, with power take-off end bearing plate interchangeable with adaptors for direct connected pumps, generators, gear boxes and clutches; Efficient air cooling provides unfaltering engine operation through a wide temperature range. These and many other diesel design features give you unequalled, wear-free performance . . . assuring absolute maximum service life, absolute minimum maintenance.

The GAC-2 is available now – for your oil field applications and as power for time-tested American MARC 5KW generator sets. Select the GAC-2, your best buy in a natural gas engine.

For complete operating data including specifications, features and prices, write, wire or phone today. Your inquiry will be handled immediately.

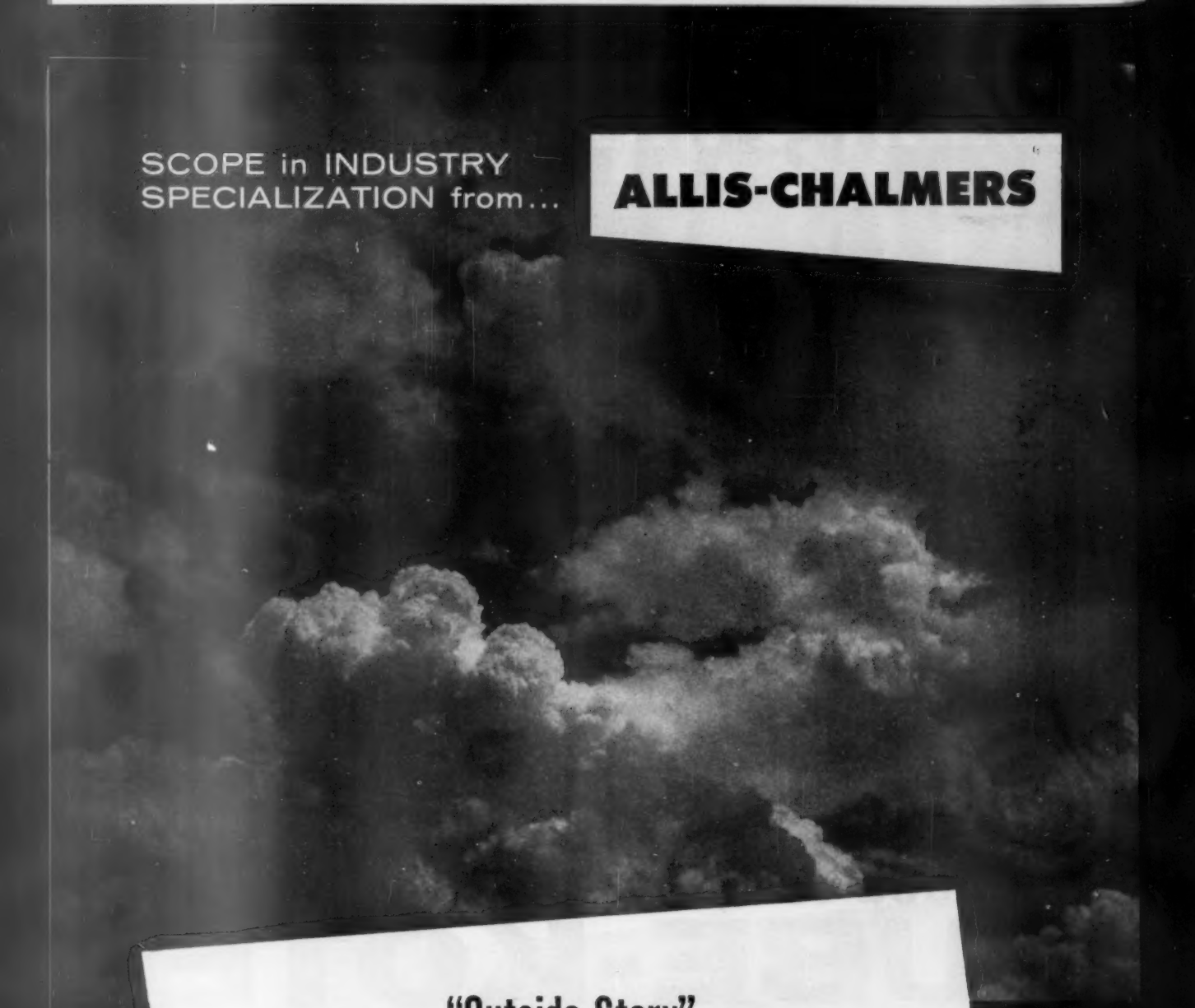
AMERICAN MARC INC.
Dept. 014 1601 West Florence Avenue, Inglewood, California
Phone ORegon 8-7174

Distributors in major marketing areas of the United States, Canada and Latin America.
Representatives in the Near East, Far East, Europe and The United Kingdom.

NATURAL GAS ENGINES • DIESEL ENGINES • GENERATORS • GENERATOR SETS

SCOPE in INDUSTRY
SPECIALIZATION from...

ALLIS-CHALMERS



an "Outside Story" about Allis-Chalmers products

Self-protection against weather is built into a variety of Allis-Chalmers products — electrical or mechanical. This "Outside Story" through a broad range of A-C equipment (and only A-C offers such a scope of outdoor products) *eliminates the need for costly protective enclosures in many operations.*

Pumps, motors, compressors, mechanical drive equipment, control and switchgear with inspection alleys — all are designed to perform 'round the calendar while exposed to the elements.

For single-source availability of a tremendous scope of up-to-date equipment, designed for outstanding quality control, contact your A-C representative. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Products for Petroleum: Electrical Generation and Distribution Equipment; Pumps (rotary vacuum and centrifugal); Compressors; Motors and Control; Mechanical Power Transmission Equipment; Water Conditioning Systems, plus Materials Handling Equipment.

A-C ALLIS-CHALMERS

A-5917-P

No need to baby TK-33

TUBE-KOTE®

Coatings can take it!

TK-33 is recommended for use in water injection wells, disposal wells, flow lines, production tubing, sucker rods and other accessory equipment where the environmental mineral temperature does not exceed 220°F. TK-33 has outstanding flexibility and impact resistance properties. You don't have to baby TK-33.

TK-33 won't crack, chip or craze, even when bent double. This illustration shows a piece of aluminum tubing coated with TK-33, split open and bent double. There is no evidence of surface damage to coating.

TUBE-KOTE

Service Mark Reg. U. S. Pat. Off.

P. O. Box 20037 • Houston 25, Texas

Branch plants: Harvey, Louisiana
Midland, Texas

OUR 20TH YEAR . . .
THE INDUSTRY PIONEER

SCOPE in
MOTOR DESIGN from...

ALLIS-CHALMERS

The motor with coils that can be

Hi-potted Under Water

Remarkable insulating systems combined with advanced mechanical features are the story behind the *Super-Seal* motor. You get complete protection from moisture, chemicals and other contaminants, even with so-called drip-proof motor enclosures.

New motor is protected with *Silco-Flex* stator coil insulating system: A homogeneous dielectric barrier of vulcanized silicone rubber so moisture-proof it can be hi-potted under water . . . cleaned by hosing down. Resists most corrosive or chemical atmospheres.

Integrated field coils in synchronous machines are completely sealed against contaminants, bonded and locked against mechanical forces.

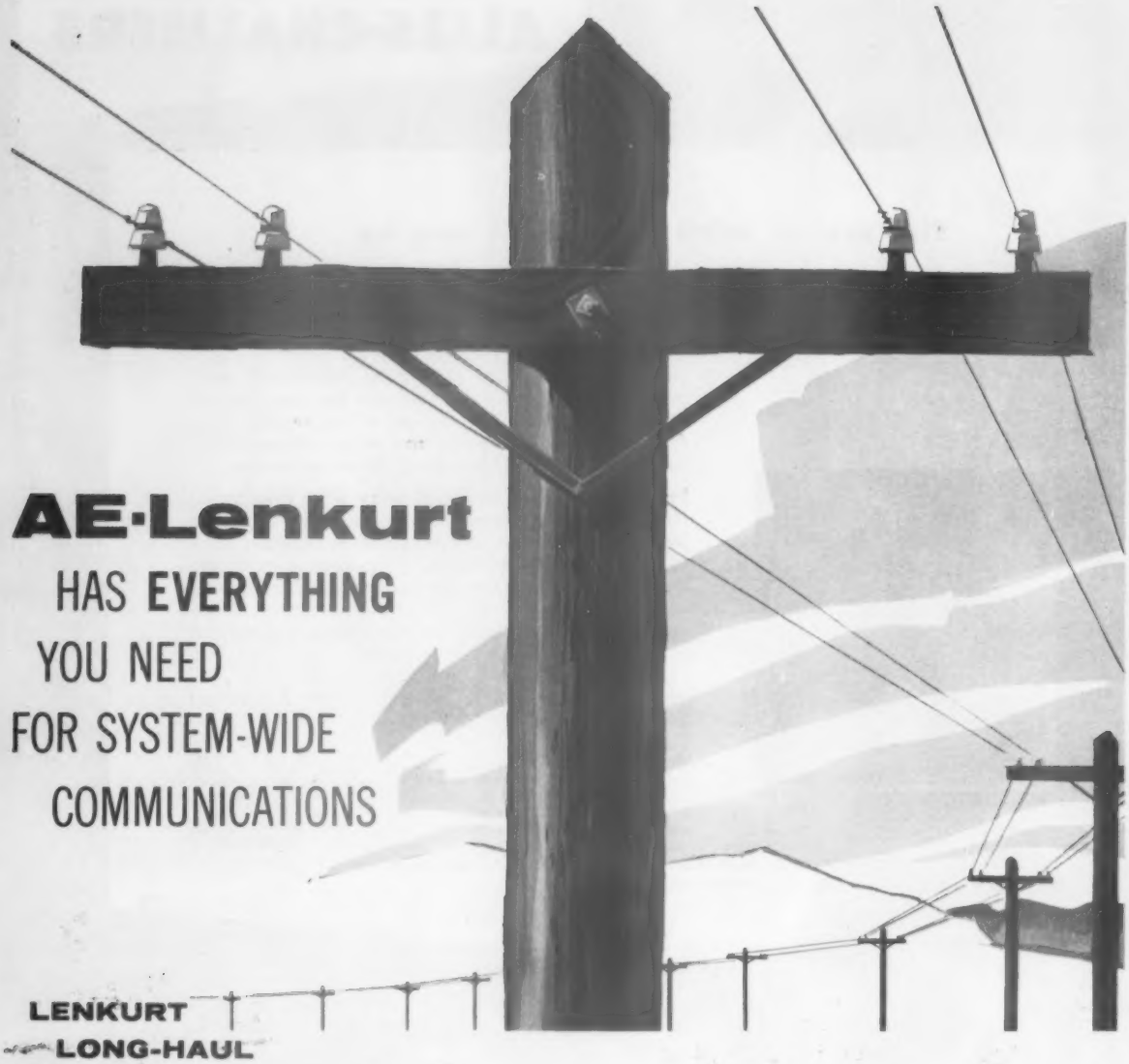
For additional information, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Super-Seal and *Silco-Flex* are Allis-Chalmers trademarks.

Here's high-potential test of *Silco-Flex* coils under water, with test voltage applied for one minute between conductor and water bath.

A-C ALLIS-CHALMERS

A 5949 P



AE·Lenkurt

HAS EVERYTHING YOU NEED FOR SYSTEM-WIDE COMMUNICATIONS

LENKURT LONG-HAUL CARRIER, for instance...

Where distance is a problem, the Type 32E Carrier Telephone System is one of the Lenkurt systems available as a solution. It is an economical and efficient means of adding communication channels to existing wire lines.

Type 32E single sideband suppressed carrier terminals are equipped with either three or four channels in the 3-kc. to 35-kc. range, and can be applied over v-f circuits. With the use of repeaters, these channels can be used for high quality, medium- and long-haul circuits. System levels and frequencies coordinate with those used in Western Electric Type C carrier equipment.

The AE-Lenkurt team of engineers is equipped to handle as little or as much of the planning and installation as you wish. And AE will provide "follow-thru" service *for the life of the equipment.*

For full information on the Lenkurt Type 32E or companion equipment, call your Automatic Electric representative, or write the Director, Petroleum Sales, Automatic Electric Sales Corporation, Northlake, Illinois.

ALL YOUR COMMUNICATIONS NEEDS
FROM ONE
DEPENDABLE SOURCE

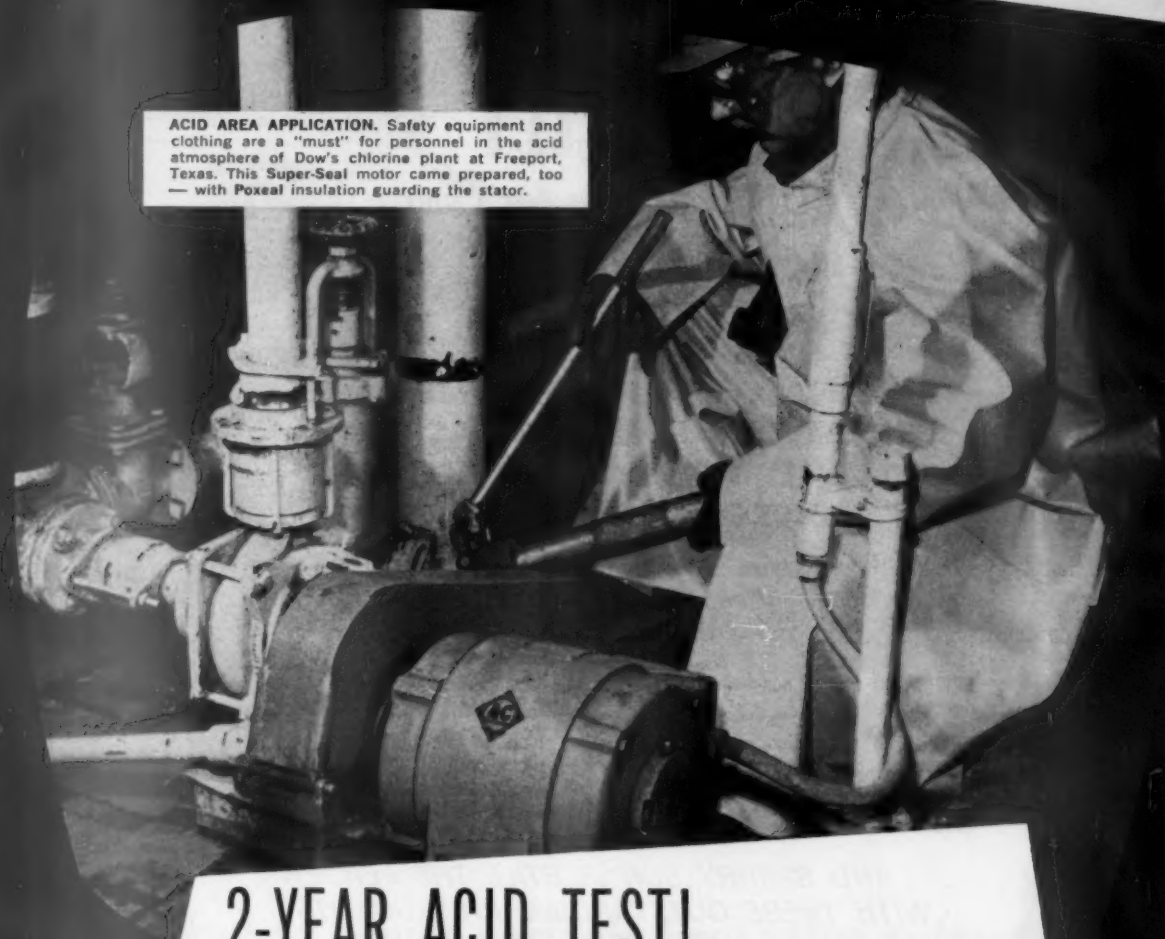
AUTOMATIC ELECTRIC GENERAL SYSTEM

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

SCOPE in MOTOR DEVELOPMENT from . . .

ALLIS-CHALMERS



ACID AREA APPLICATION. Safety equipment and clothing are a "must" for personnel in the acid atmosphere of Dow's chlorine plant at Freeport, Texas. This Super-Seal motor came prepared, too — with Poxeal insulation guarding the stator.

2-YEAR ACID TEST!

Open motor beats enclosed type at its own game

In a tough acid pump installation, Dow Chemical's Texas Division experienced no end of motor troubles. It seemed nothing could stand up in that humid, corrosive atmosphere. Reports Dow: "Even with totally enclosed motors, winding failures were frequent." And, they might have added, expensive.

Then came *Super-Seal* motors — Allis-Chalmers open-type motors with amazing *Poxeal* insulation. A durable case of epoxy-resin encloses the winding end turns and slot portions of the stator . . . the most complete protection ever developed. Result? The *Super-Seal* motor, after two years of continuous operation in the acid area, is as good as ever. So good, in fact, that Dow has ordered 150 *Super-Seal* motors for a new chemical plant at Freeport, Texas.

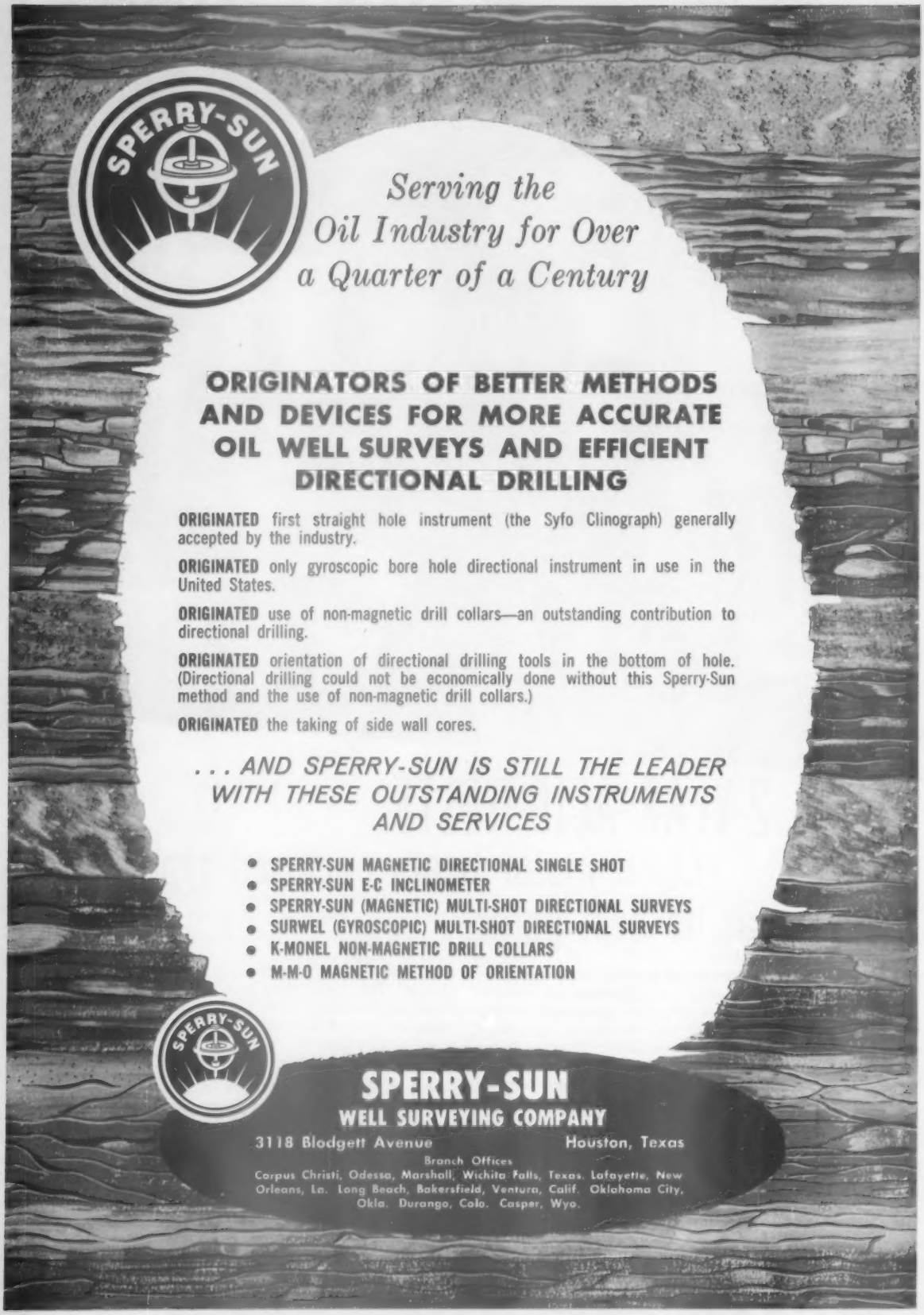
Isn't it time to revaluate *your* motor standards? There's a good chance that costly enclosed motors are no longer needed. Contact your A-C representative or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Super-Seal and *Poxeal* are Allis-Chalmers trademarks.

A-1036-C&P

A-C ALLIS-CHALMERS

SUPER SEAL


SPERRY-SUN
Serving the
Oil Industry for Over
a Quarter of a Century
ORIGINATORS OF BETTER METHODS AND DEVICES FOR MORE ACCURATE OIL WELL SURVEYS AND EFFICIENT DIRECTIONAL DRILLING
ORIGINATED first straight hole instrument (the Syfo Clinograph) generally accepted by the industry.
ORIGINATED only gyroscopic bore hole directional instrument in use in the United States.
ORIGINATED use of non-magnetic drill collars—an outstanding contribution to directional drilling.
ORIGINATED orientation of directional drilling tools in the bottom of hole. (Directional drilling could not be economically done without this Sperry-Sun method and the use of non-magnetic drill collars.)
ORIGINATED the taking of side wall cores.
. . . AND SPERRY-SUN IS STILL THE LEADER WITH THESE OUTSTANDING INSTRUMENTS AND SERVICES
• SPERRY-SUN MAGNETIC DIRECTIONAL SINGLE SHOT
• SPERRY-SUN E-C INCLINOMETER
• SPERRY-SUN (MAGNETIC) MULTI-SHOT DIRECTIONAL SURVEYS
• SURWEL (GYROSCOPIC) MULTI-SHOT DIRECTIONAL SURVEYS
• K-MONEL NON-MAGNETIC DRILL COLLARS
• M-M-O MAGNETIC METHOD OF ORIENTATION
SPERRY-SUN
SPERRY-SUN
WELL SURVEYING COMPANY
3118 Blodgett Avenue Houston, Texas
Branch Offices
Corpus Christi, Odessa, Marshall, Wichita Falls, Texas. Lafayette, New Orleans, La. Long Beach, Bakersfield, Ventura, Calif. Oklahoma City, Okla. Durango, Colo. Casper, Wyo.

Now...put your whole team ON THE FIRE!

More than a quarter of a million gallons of expanded FOAM using just one 1000-gal. tank of ROCKWOOD Double-Strength FOAM liquid! That's the amazing fire-fighting power of this compact, ROCKWOOD-equipped truck at a large eastern oil refinery.

ROCKWOOD Automatic Controls permit delivery of FOAM or water from any or all of six 2½" FogFOAM Nozzles and Direct Manual Turret at any desired rates. System includes 500-gal. "starter" water tank.

Let Rockwood handle variable flow rates automatically

Now you can set and forget FOAM liquid injection rates . . . release that "extra man" for *active* duty!

ROCKWOOD Balanced Pressure Proportioning System will automatically maintain FOAM liquid percentage precisely where you set it at any flow rate. No adjustment with valves and meters . . . no constant gage watching. Operate line outlets and turret individually or in any combination to deliver desired FOAM solution or water simultaneously; you're sure of maximum flexibility and complete reliability under all fire conditions.

ROCKWOOD Proportioning System gets you into action faster, too . . . keeps you going longer: water tank handles supply while you're hooking into local source. Tank of ROCKWOOD Double-Strength FOAM liquid doubles FOAM-making ability . . . halves storage space!

Get complete details on ROCKWOOD Proportioning System and ROCKWOOD Double-Strength FOAM liquid. It's the high-efficiency, extra-economy combination for all hydrocarbon fire situations. Tested and listed by Underwriters' Laboratories, Inc.

ROCKWOOD SPRINKLER COMPANY

Engineers Water . . . to Cut Fire Losses

ROCKWOOD Double-Strength (3%) FOAM Liquid

- Costs less for equal coverage
- Doubles FOAM-making ability per unit volume
- Reduces handling and transportation costs by 50%
- Cuts storage space in half
- Protects in all weather

ROCKWOOD SPRINKLER COMPANY
Portable Fire Protection Division
481 Harlow Street, Worcester 5, Massachusetts

Please send me details on Balanced Pressure Proportioning System and Double-Strength FOAM liquid.

Name.....

Title.....

Company.....

Street.....

City.....*Zone*....*State*.....

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

ALOUETTE

MODERN PIONEER OF THE FAR NORTH

Newest bird in the wilds of Alaska and northern Canada is the Alouette, world's first production turbine-powered helicopter. In once-inaccessible corners of our 49th State, as well as in wilderness areas of Canada, the Alouette is doing "impossible" jobs with a minimum of fuss and feathers. As a passenger craft, a utility workhorse, a fire-fighter, an ambulance, and in any role it's called on to fill, the Alouette does its work efficiently, quickly, economically. The Alouette is performing yeoman service for a wide range of industries.*

- *Greatest fuel flexibility: uses JP-1, JP-4, 640 Kerosene, or Diesel*
- *Instant take-off*
- *Simplified controls*
- *Instantaneous power response*
- *Low maintenance time to flight time*
- *Top performance in extreme hot or cold weather*

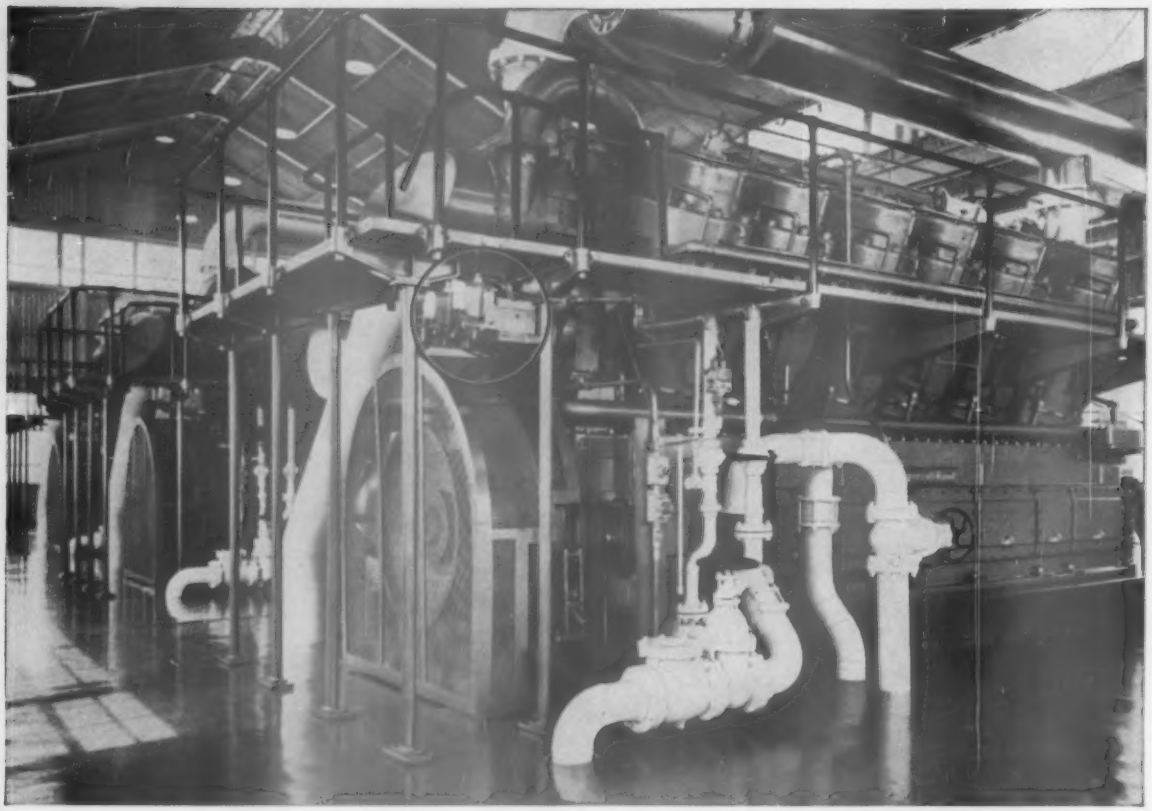
**Designed by Sud Aviation of France*

THE ALOUETTE IS ASSEMBLED, TESTED AND DISTRIBUTED BY:

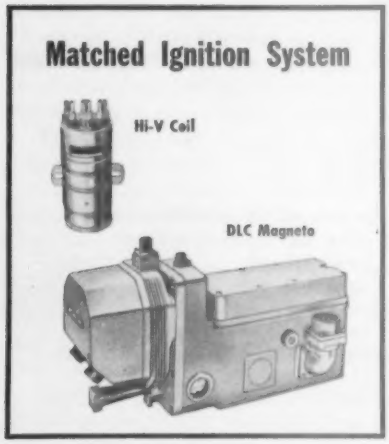
REPUBLIC AVIATION CORPORATION

HELICOPTER DIVISION

FARMINGDALE, LONG ISLAND, N. Y.



SERVING TRUNKLINE GAS COMPANY OF HOUSTON —A VITAL LINK IN THE NATION'S ECONOMY!



Trunkline Gas Company of Houston, Texas, operates a natural gas transmission line extending from near McAllen, Texas, to Tuscola in central Illinois where it connects with the line of the Panhandle Eastern Company.

This gas line crosses Texas, Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and the southern half of Illinois —a vital link in the nation's economy.

Helping to serve this very important segment of the nation's natural gas transmission system is the battery of Ingersoll-Rand 412 KVS engines equipped with Bendix DLC6 magnetos and Bendix HI-V transformer coils (illustrated at left) in Trunkline's Cypress Compressor Station near Houston.

The Bendix DLC6 magneto is a completely new type of magneto, incorporating the latest engineering design. Together with the Bendix HI-V transformer coil it becomes a matched ignition system that delivers more than ample voltage with greatly reduced maintenance cost.

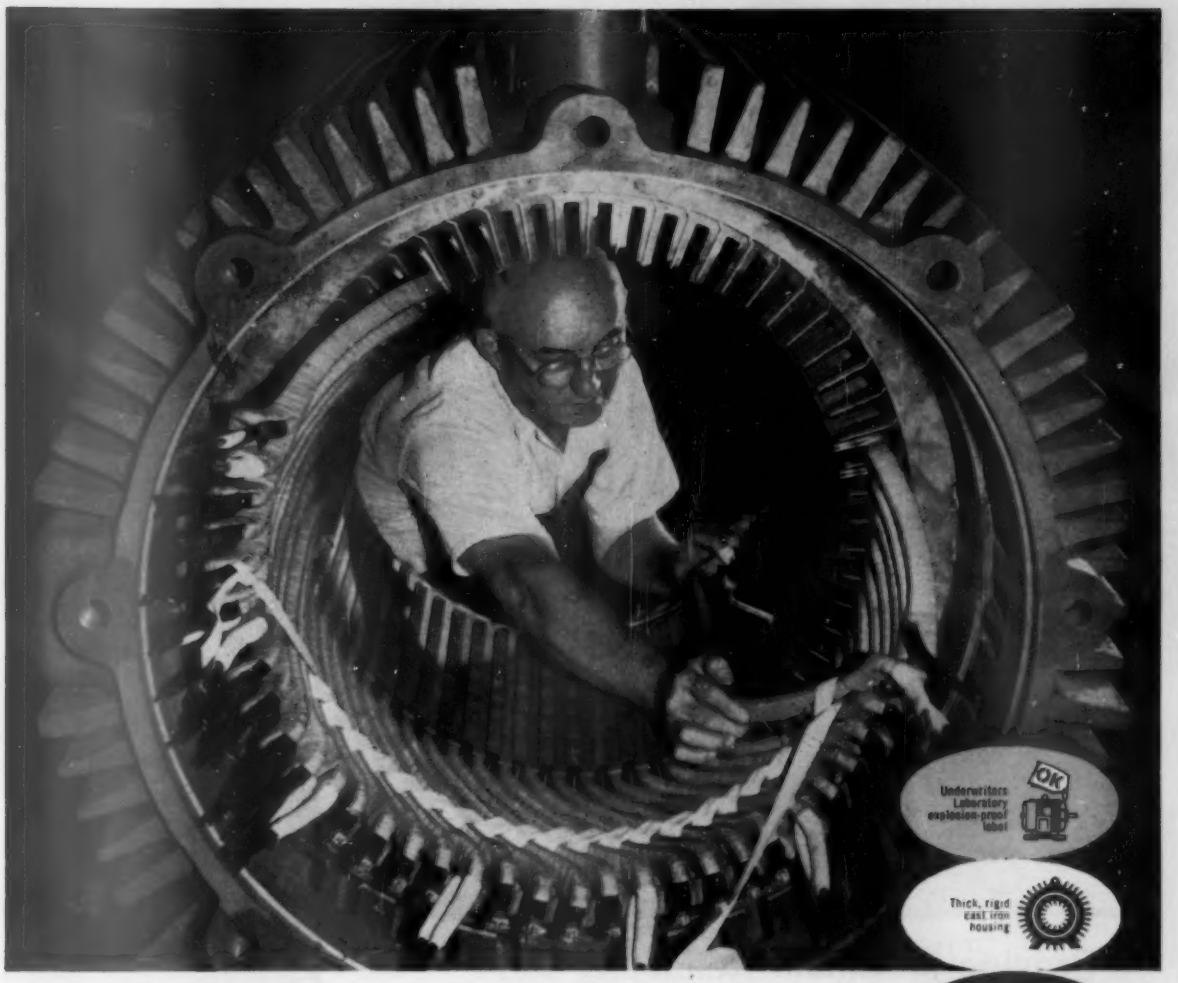
SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, SIDNEY, N. Y.

Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N. Y.
Canadian Affiliate: Aviation Electric Ltd., 200 Laurentien Blvd., St. Laurent, Montreal 9, Quebec

FACTORY BRANCH OFFICES: 117 E. Providencia Avenue, Burbank, California • 545 Cedar Lane, Teaneck, New Jersey • Paterson Building, 18038 Mack Avenue, Detroit 24, Michigan • 5906 North Port Washington Road, Milwaukee 17, Wisconsin • Hulman Building, 120 West Second Street, Dayton 2, Ohio • 2608 Inwood Road, Dallas 19, Texas • Boeing Field, Seattle 8, Washington • 1701 "K" Street, N. W., Washington 6, D. C.

Scintilla Division
SIDNEY, N. Y.

Bendix
AVIATION CORPORATION



Enclosed and explosion-proof motors... with built-in corrosion resistance

Large Louis Allis motors shrug off abuse... resist corrosion... run for years indoors and outdoors in unattended locations

No job is too tough for these large-frame explosion-proof motors. You can install them in the plant or in remote outdoor locations and virtually forget them. They'll give you long, trouble-free service with a minimum of attention.

Originated by Louis Allis, these dependable motors incorporate the latest design and construction features for safe operation in hazardous and highly corrosive atmospheres. The rugged cast iron housing resists corrosion . . . protects motors from the weather and accidental damage . . . and assures motor alignment for longer life.

Special Louis Allis varnishes insulate motors against heat, moisture, and corrosive gases and liquids. This, plus the heat-dissipating housing surfaces and controlled air flow, keeps motor temperature at a safe operating level. All parts are precision-machined and dynamically balanced for smooth, quiet operation. Rugged split-sleeve bearings are well lubricated and effectively sealed to keep oil in, dirt and water out... can be easily replaced when necessary.

Standard ratings for Louis Allis enclosed and explosion-proof motors range up to 700 hp. They're available with electrical and mechanical modifications to meet every need. Ask your Louis Allis District Office for Bulletin No. 1950—or write The Louis Allis Co., 449 East Stewart Street, Milwaukee 1, Wisconsin.

LOUIS ALLIS

LA-128

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

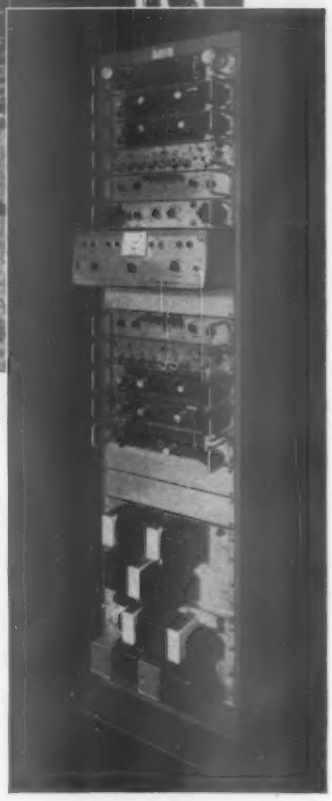
PHILCO.
Communications Systems

Provide Maximum Reliability and Economy for Pipeline Control

Philco communications systems are custom designed to suit each user's specific requirements.

Featuring the outstanding CLR-9 duplex microwave terminal, Philco systems provide highly reliable, unattended, point-to-point communications for voice, telemetering, VHF and remote control of pump stations . . . plus high speed data transmission.

PLUS PHILCO'S TURNKEY SERVICES. Philco's complete turnkey service includes—*site surveys* by competent survey engineers experienced in field techniques; *system planning* by Philco systems engineers who design your complete communications systems; *installation* of your system by Philco field engineers—including erection of towers and shelters; and, Philco field engineers are available for *field service*—periodic inspection and preventive maintenance—to maintain the highest standards of system performance. For complete information, write today.

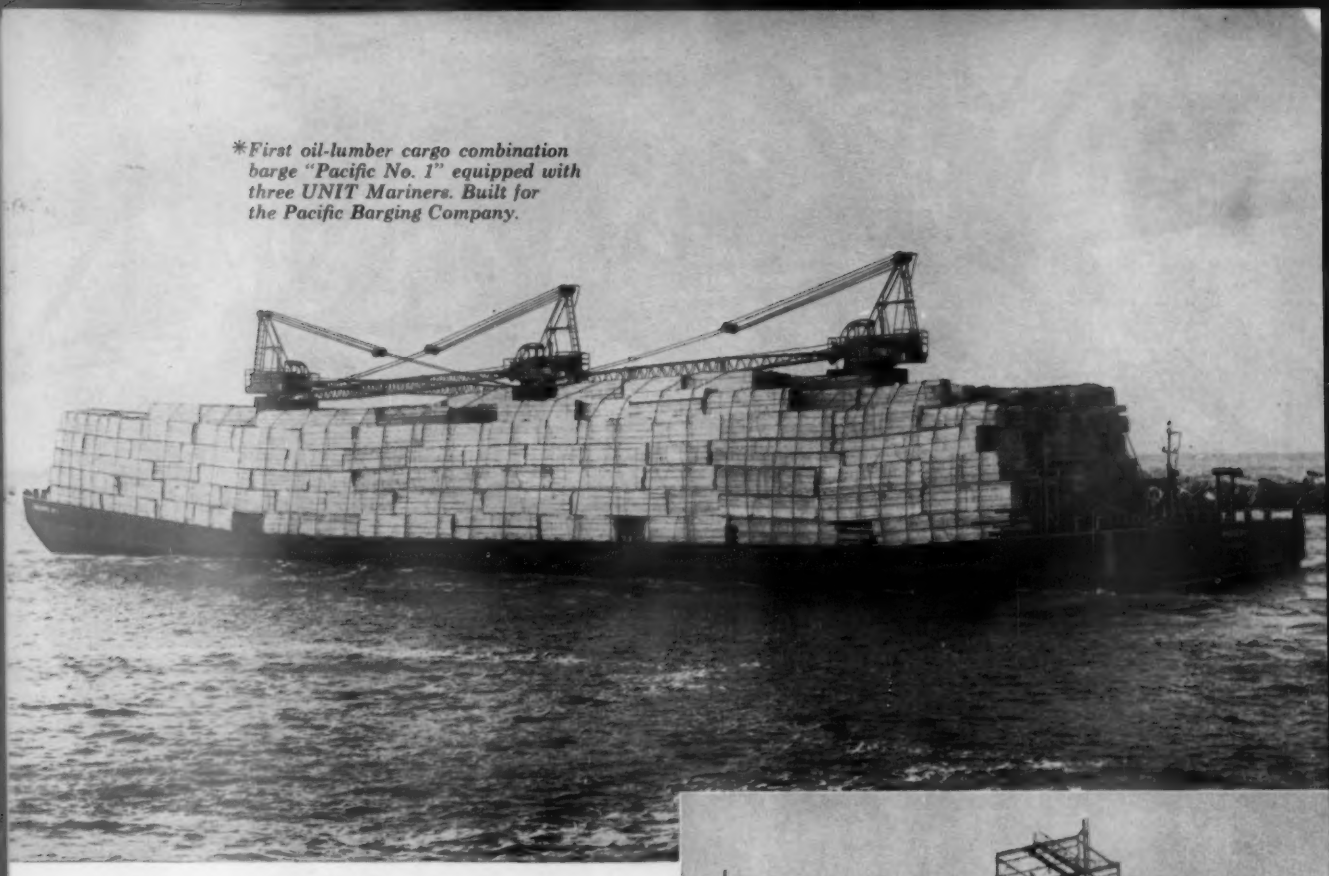


CLR-9 TERMINAL
(with standby)

- Plug-in Printed Wiring Chassis
- Built-in Metering and Test Circuits—in a Single Test Panel
- Expandable—Wide Bandwidth Suitable for Computer Control and Data Transmission
- Heavy Duty, Tubeless Power Supplies
- Convection Cooled Klystrons—No Blowers
- Up to 240 Voice Channels
- Compatible With All Multiplex Equipment
- Operates in the 6000 mc to 8000 mc Bands

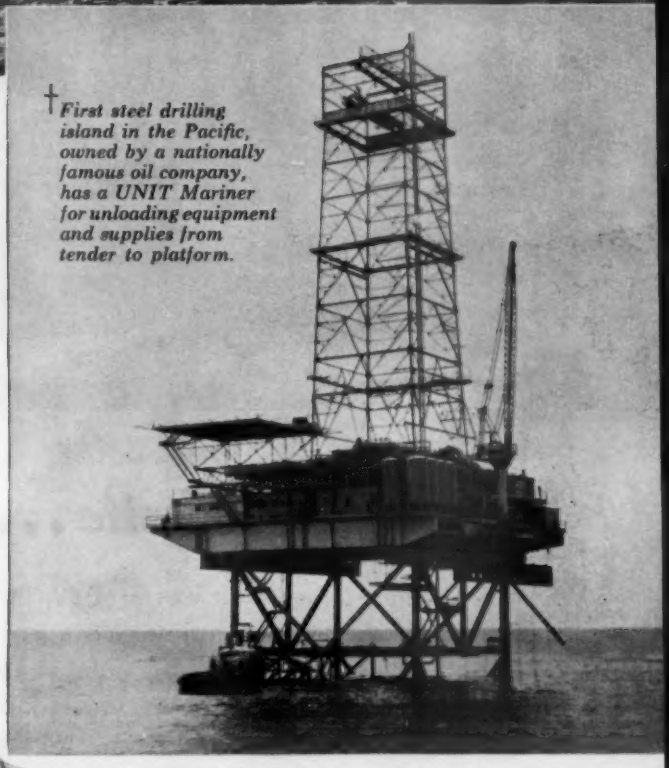
PHILCO QUALITY FIRST!

Government and Industrial Division, 4700 Wissahickon Ave., Philadelphia 44, Pa.
In Canada: Philco Corporation of Canada Limited, Don Mills, Ontario



*First oil-lumber cargo combination barge "Pacific No. 1" equipped with three UNIT Mariners. Built for the Pacific Barging Company.

a pair of FIRSTS for UNIT



†First steel drilling island in the Pacific, owned by a nationally famous oil company, has a UNIT Mariner for unloading equipment and supplies from tender to platform.

FIRST Oil-Lumber Cargo Barge
FIRST Steel Drilling Island

Equipped with UNIT Mariners for Cargo Handling

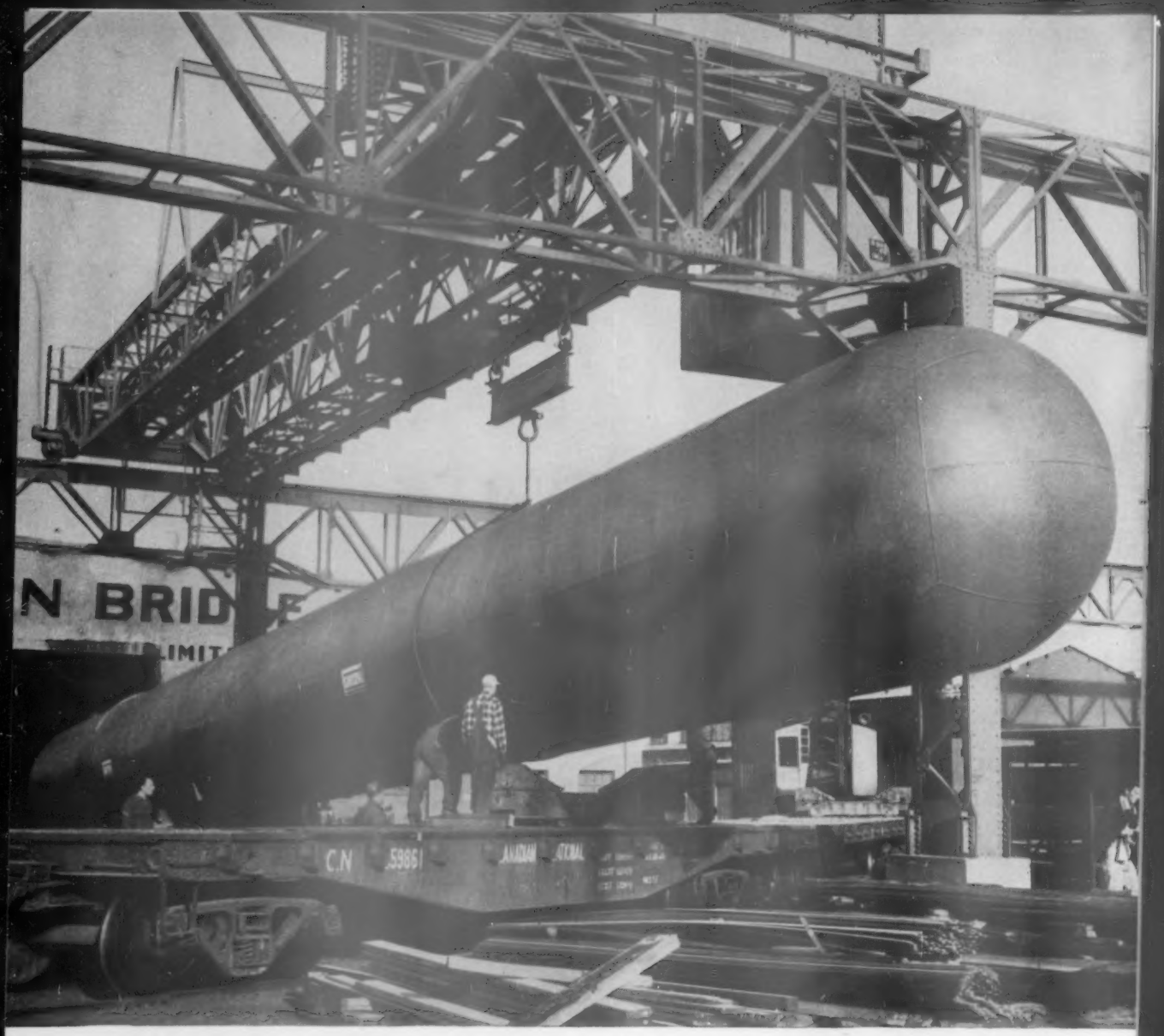
Specially designed and built for the marine field, UNIT Mariner Cranes are being successfully used for handling cargo from a fixed mounting on ships, barges, tenders and offshore drilling platforms.

Unlike the ratings of conventional cranes, the Mariner has all the safety factors outlined in the requirements for cargo gear of the American Bureau of Shipping. Turntable, roller path, rollers, hook shoes, boom hoist mechanism, "A" frame and boom have extra built-in strength. The positive boom stops control the angle of boom elevation, and the FULL VISION CAB enables the operator to see in all directions. All gears are enclosed in a sealed gear case as a protection against salt spray.

The Mariner handles cargo with ease, speed and pin point accuracy. Get all the facts. Write for bulletin.

UNIT MARINER

UNIT CRANE & SHOVEL CORP.
6327 West Burnham Street
Milwaukee 19, Wis., U.S.A.



No Guided Missile...

... this butane storage tank was skilfully guided from blueprint stage through manufacturing, thence by special train to a western oil refinery.
120 ft. long, 10 ft. in diameter and weighing 45 tons with a capacity of 67,200 gallons at 90 lbs. psi—this product of our Calgary branch is one of the largest tanks of its kind ever made in Canada —two more are on order.
We are ready to solve *your* platework problems . . . large or small.

PLATEWORK BY

DOMINION BRIDGE

DOMINION BRIDGE COMPANY, LIMITED

Plants: MONTREAL • OTTAWA • TORONTO • SAULT STE. MARIE • WINNIPEG • CALGARY • EDMONTON • VANCOUVER

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Divisions:
Platework • Structural
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NEW 350 BANTAMS

—the pipeliner's all-purpose machines!

BANTAM's all-new Series 350 models—carrier mounted, crawler or self-propelled—combine bigger capacity, bigger production and more flexibility to offer more of what a pipeliner needs than any other rigs in their class.

Take this new BANTAM C-350 crawler back hoe. Now it digs to 18'10" deep with new optional long back hoe —with the power and fast-action cycle that take you through even the toughest rocky, frozen or hard pan conditions with highest speed and ease. BANTAM's all-new undercarriage has the solid stability to climb and work tough grades with standard or long side frames . . . the high flotation to give you big production in wet, swampy conditions with pads up to 32" wide. Keep up with any job schedule with BANTAM's *standard* 2-speed independent travel.

High-production trenching *alone* makes the C-350 BANTAM crawler the most profitable pipeliner's rig its size today. But this is only the start! You make more from BANTAM's *all-around job versatility* working with 11 BANTAM-built attachments. Crane capacity of 7 and 8 tons speeds up pipelifting, lowering, placing and stockpiling assignments. It handles cleaning operations and bell-hole excavating as a clam shell . . . or backfilling, tamping, erecting, pile-driving—any job that comes up anywhere, regardless of ground conditions.

The widest choice of options and mountings lets you build a 350 BANTAM exactly to your job and price requirements.

NEW T-350 — all-new carrier mounted BANTAM T-350 has up to 11-ton capacity. Highest mobility, fastest working speed to handle scattered jobs faster. Choice of four new BANTAM-built carrier models. Works with all 11 BANTAM-built attachments. Remote control available.

NEW CR-350—all-new BANTAM self-propelled has 1-engine, 1-man operation and travel. Ideal pipe-handling rig in yards, rail sidings, on the job. Automotive-type power steering, optional 4 x 4 drive. Eleven-ton capacity. Works with all 11 BANTAM attachments.

World's largest producer of truck crane-excavators

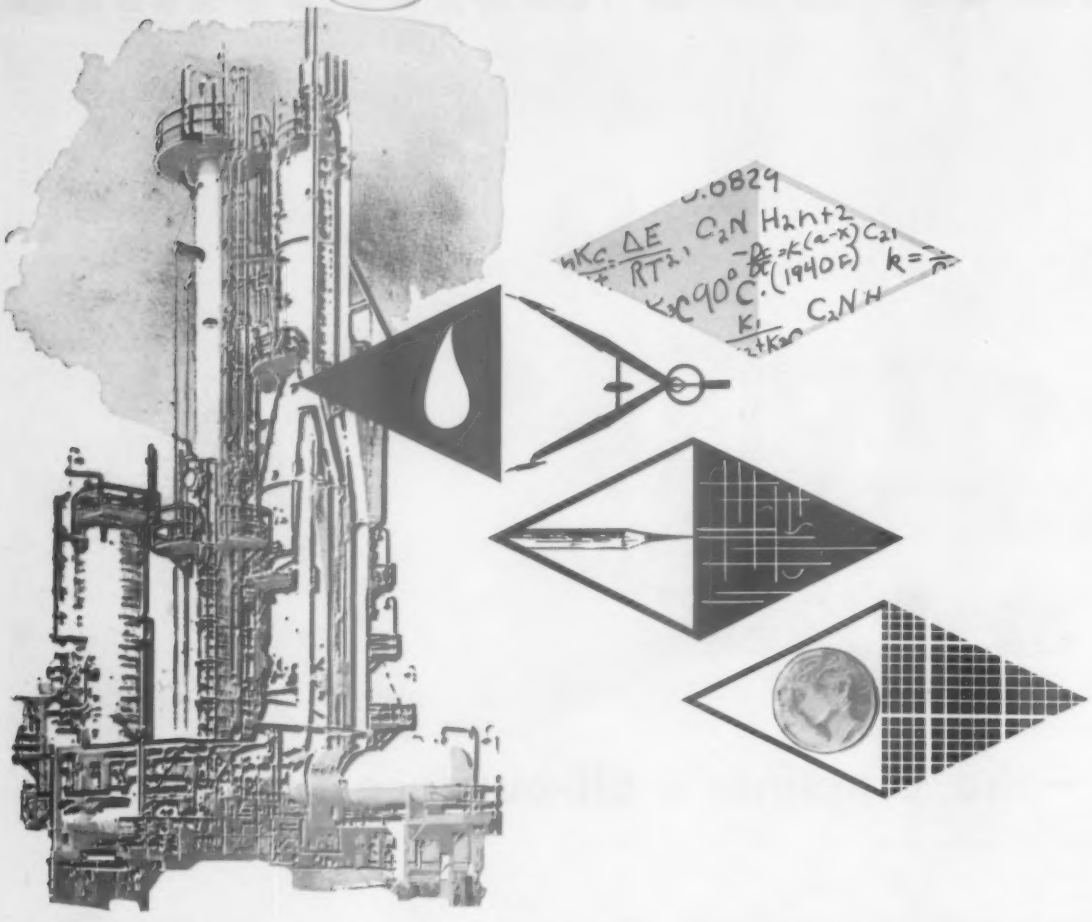
SCHIELD Bantam Co.

Schield Bantam Co., 243 Park Street, Waverly, Iowa PC-218
Send information on

( ) crawler mounted BANTAM C-350 for pipeline work,
( ) carrier mounted BANTAM T-350,
( ) BANTAM self-propelled CR-350.

Name.....
Company.....
Address.....
City.....Zone....State.....

intangibles were never so important



PRECISION CONSTRUCTION

Worker recruiting and training . . . special safety programs . . . on-the-spot solutions to pressing problems . . . these and other extras are included in Procon service. Applying such intangibles to construction of petroleum, chemical and petrochemical plants is the specialized function of Procon. Modern, efficient construction techniques form but a part of the precision construction system developed by Procon. That is why a Procon-built plant can be depended upon to more than meet specifications.

PROCON ®

PROCON *Incorporated*

1111 MT. PROSPECT ROAD, DES PLAINES, ILLINOIS, U.S.A.

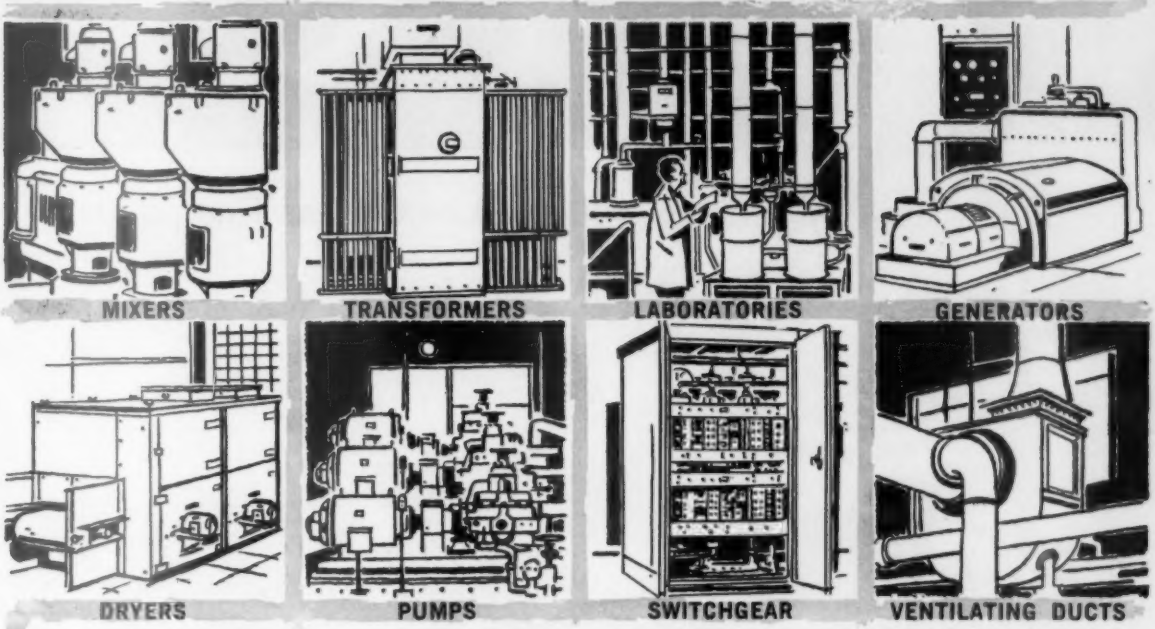
PROCON (CANADA) LIMITED, TORONTO 18, ONTARIO, CANADA

PROCON (GREAT BRITAIN) LIMITED, LONDON, W. C. 2, ENGLAND

PROCON INTERNATIONAL S. A., SANTIAGO DE CUBA

WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

Which of these common fire hazards threaten you?

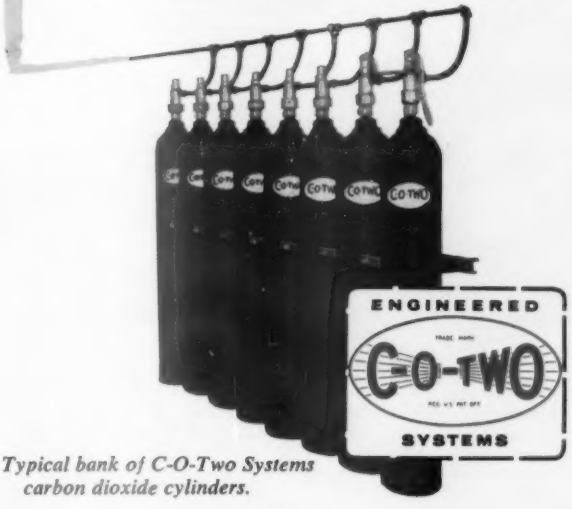


If your plant has one or more of these common fire hazards, ordinary fire protection may not prove adequate! You also need special fixed-type protection that constantly guards specific highly hazardous areas!

C-O-Two Fire Extinguishing Systems are specially designed for closed or partially-closed spaces in which highly flammable liquids or solids are manufactured, handled or stored . . . or where there is fixed or rotating electrical equipment. The C-O-Two line includes dependable, high-quality carbon dioxide, dry chemical or foam systems to extinguish fire, plus detecting systems to detect and locate fire automatically.

Your experienced C-O-Two representative is well qualified to carefully analyze all special hazards. Because he offers the industry's largest line of fire protection products and services, he can make equipment recommendations without prejudice. Each C-O-Two System is carefully engineered and manufactured . . . and C-O-Two will also expertly install the system, if desired.

Why not review your common fire hazards now? If protection is either lacking or inadequate, you can confer at no obligation with your nearby C-O-Two Industrial Fire Protection Engineer! Call him today at these offices:



Typical bank of C-O-Two Systems carbon dioxide cylinders.

products of
THE FYR-FYTER COMPANY

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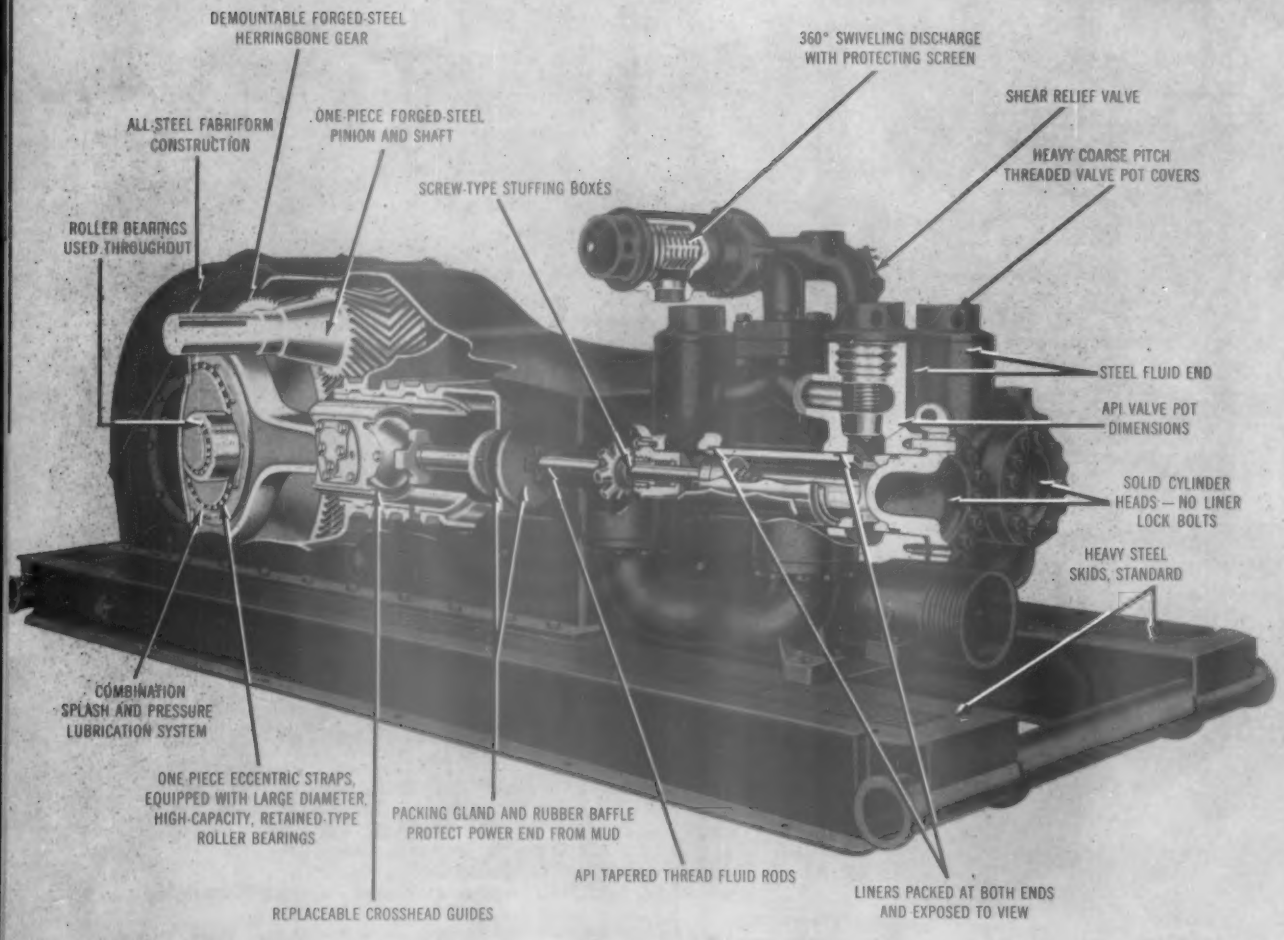
NOW 7 CONTINENTAL-EMSCO SLUSH PUMP SIZES

a complete line able to provide all the mud pressures and volumes needed for today's drilling rigs

Feature by Feature..you can't beat these Pumps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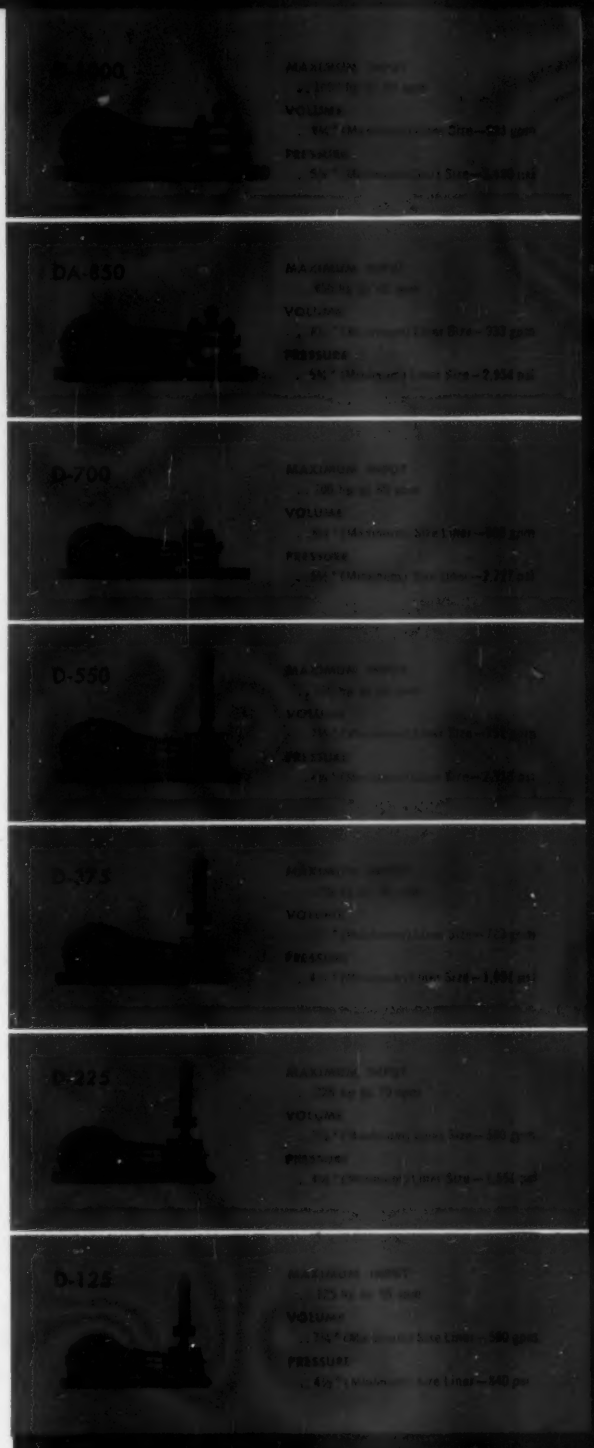
360° SWIVELING DISCHARGE WITH PROTECTING SCREEN
SHEAR RELIEF VALVE
ALL-STEEL FABRIFORM CONSTRUCTION
ONE-PIECE FORGED-STEEL PINION AND SHAFT
HEAVY COARSE PITCH THREADED VALVE POT COVERS
SCREW-TYPE STUFFING BOXES
ROLLER BEARINGS USED THROUGHOUT
STEEL FLUID END
API VALVE POT DIMENSIONS
SOLID CYLINDER HEADS — NO LINER LOCK BOLTS
HEAVY STEEL SKIDS, STANDARD
COMBINATION SPLASH AND PRESSURE LUBRICATION SYSTEM
ONE PIECE ECCENTRIC STRAPS, EQUIPPED WITH LARGE DIAMETER, HIGH-CAPACITY, RETAINED-TYPE ROLLER BEARINGS
PACKING GLAND AND RUBBER BAFFLE PROTECT POWER END FROM MUD
API TAPERED THREAD FLUID RODS
LINERS PACKED AT BOTH ENDS AND EXPOSED TO VIEW
REPLACEABLE CROSSHEAD GUIDES

POWER END DESIGN

In place of bulky steel castings, a smooth, easy to handle steel fabriform frame is used. Fabriform construction allows critical stress areas to be reinforced scientifically, and it is as strong, yet lighter than castings. The massive main gear, of wear-resisting heat-treated forged steel, is designed to handle the highest of mud pressures. It is matched with a long-wearing, heat-treated forged-steel pinion, machined integrally with its shaft. Roller bearings, used throughout, reduce power loads and eliminate need for bearing adjustment. Crosshead guides (slippers in larger pumps) can be replaced for added years of pumping.

FLUID END DESIGN

Steel castings are electrically welded into compact fluid ends to handle the highest of mud pressures. Suction passages are large, direct and smoothly curved to speed fluid flow, even when pumping heavy muds. Use of one suction eliminates *dead spaces* which tend to restrict flow. A separate pot for each valve provides easy access to valve chambers. Screw-type valve-pot covers speed valve replacement. Patented "exposed" liner construction prevents costly washouts and damage to liner or fluid ends, because leaks can be spotted and packing tightened before damage occurs. Screw-type stuffing box glands apply an even pressure for packing and eliminate uneven packing wear and scoring of piston rods.



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Features of Construction:

Powell Corrosion Resistant Valves are made in stainless steel, Monel, nickel, Hastelloy alloys, aluminum and other special corrosion resisting metals.

Solid and double wedge discs of gate valves are interchangeable. They are precision machined and fitted and are accurately guided throughout their entire travel. This prevents drag of the disc over the seat faces, eliminating wear of seating surfaces and stops undue vibrational noises.

O.S.&Y. Valves—Stems are threaded and guided through a bronze bushing in upper yoke. (Bushings made of other alloys can be supplied on special order.) A compression lubricant fitting in upper yoke is provided to lubricate the stem and bushing threads and to reduce wear. A convenient shelf is cast on the inner sides of yoke arms for suspending the gland when renewing the packing.

All valves are regularly packed with Teflon Packing. Globe and "Y" valves are available with metal or Teflon discs.

Globe, Angle, Gate and "Y" valve stems are back seated for repacking under pressure when fully open.

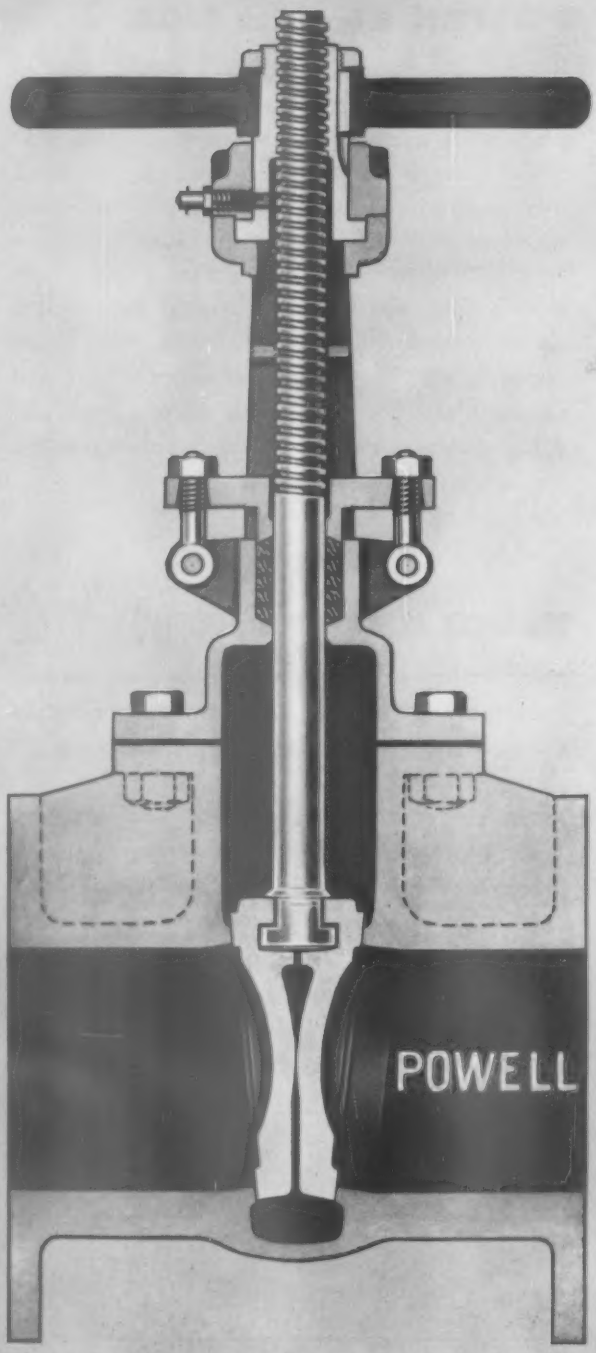


Fig. 2453 DG (Sectional)—Large Stainless Steel O.S.&Y. Gate Valve. Available with interchangeable solid or split wedges. Wedges are fully guided throughout their travel.

POWELL...world's largest family of valves

FOR CORROSION RESISTANT VALVES

Over a quarter century ago, Powell introduced the Corrosion Resistant Valve. Now, after years of pains-taking experiments and exhaustive research, Powell offers Valves to handle practically every corrosive fluid—valves of every design, and in the largest possible selection of metals and alloys.

For all your flow control requirements—water, oil, gas, air, steam, as well as corrosive fluids—Powell has the right valve in the right size and the right metal. Consult your local Powell distributor or write directly to us.

Fig. 2633—Large, Stainless Steel Swing Check Valve for 150 W.P. Sizes, 2" to 12".

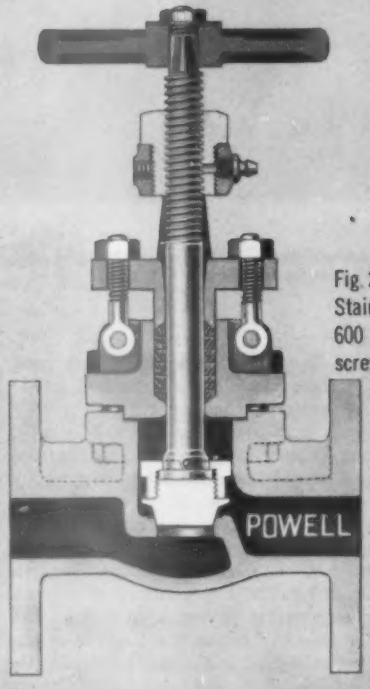


Fig. 2475 (Sectional)—150 W.P. O.S.&Y. Stainless Steel Globe Valve. 300 and 600 W.P. also available. ¼" to 3"—screwed and flanged ends.

Fig. 2106 (Sectional)—150 W.P. O.S.&Y. Stainless Steel "Y" Valve. ¼" to 3"—screwed and flanged ends. 300 W.P. valves also available.

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

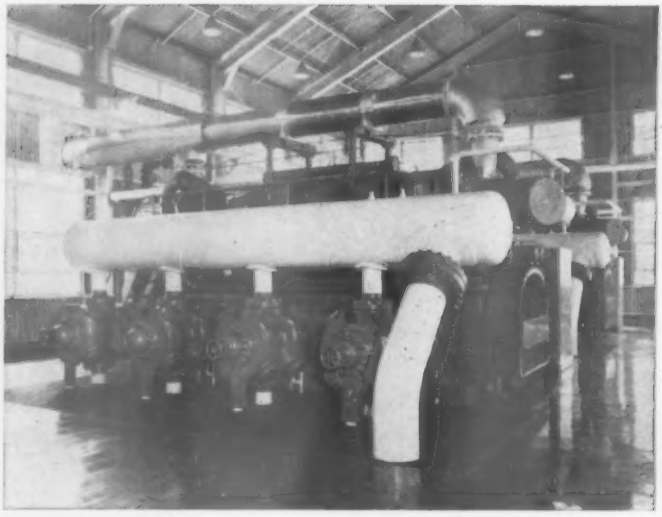
Behind this symbol

...a century of service

Here's what it means to

PIPELINE MEN...

Above are three Ingersoll-Rand Class RT centrifugal pipeline pumps in a Mid-western pumping station.



Above are two of five 2000-hp KVS turbocharged 4-cycle gas-engine compressors in a gas transmission station.

These two 220-hp PJVG gas-engine generating units provide a-c power for a gas transmission station.

At right, an I-R Dual-Drill Rig suspended from a tractor boom, powered by air from an I-R Gyro-Flo rotary portable compressor.

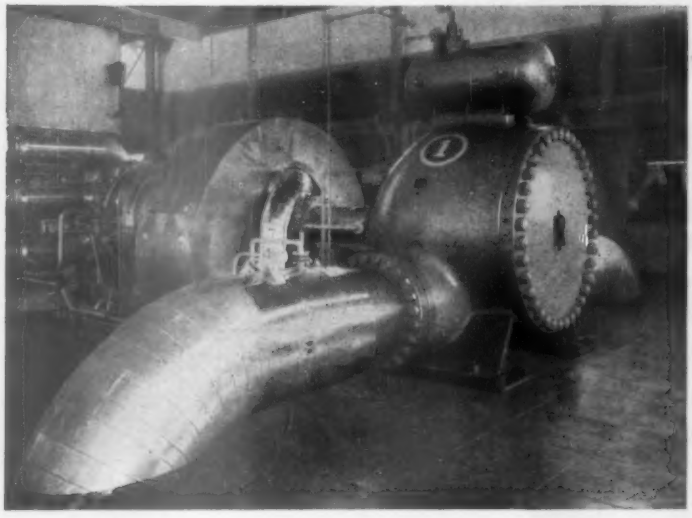
Ingersoll-Rand has the world's most comprehensive compressor experience, and builds heavy-duty reciprocating, centrifugal, rotary and jet types in all sizes. The I-R family of 4-cycle V-angle engine-compressors, ranging from 120 to 2000 hp and larger, is characterized by smooth operation and stability over a wide range of speeds and loads. Other reciprocating units are built from ½ to 7500 hp for any drive.

Heavy-duty 4-cycle, V-angle gas engines, built from 200 to 2000 hp and larger, are suitable for any prime mover application. The ultimate in standardization, similarity of operation and maintenance, and unified responsibility is possible when I-R engine-generating units are installed along with I-R engine-compressors.

I-R centrifugal pipeline compressors are the product of 28 years of experience in this specialized application. Ingersoll-Rand has pioneered in the development of centrifugal gas compressors for higher and higher pressures and capacities.

to the oil industry:

Soon after Colonel Drake discovered oil at Titusville, the history of Ingersoll-Rand began with the manufacture of Cameron reciprocating steam pumps. A few years later, other I-R "ancestor" companies began building compressors and rock drills. Ever since that time Ingersoll-Rand has been growing with the oil and gas industries. Today I-R provides the widest range of compressors, pumps and other equipment for the production, transmission, and processing of oil and gas and their products—the I-R monogram is more than ever a symbol of leadership and progress.



Above is one of ten gas-turbine-driven I-R centrifugal compressors handling natural gas at 798 psi.

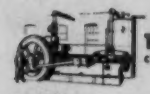
A complete line of centrifugal pumps, for service on products and crude oil pipelines, is made by Ingersoll-Rand. They are available for a wide range of capacities up to 3000 gpm and pressures up to 1200 psi in standard sizes, or designed and engineered to specifications for other applications.

Other I-R products for pipeline men include portable compressors and contractors' equipment, air and electric tools, starting-air compressors and cooling-water pumps. Your Ingersoll-Rand representative will be glad to give you more information.

I-R MILESTONES OF PROGRESS
have had a far-reaching effect on the petroleum industry

1860 The first Cameron pump—a reciprocating steam pump which found wide use in the petroleum industry.

1871 Simon Ingersoll's steam-powered rock drill.



1872 Heavy-duty reciprocating compressors.

1902 The first portable compressor.

1906 The first direct-connected synchronous-motor-driven compressor.

1912 First centrifugal compressor for 90-psi air, and powered by I-R turbine.

1913 Centrifugal pump.

1920 Oil-engine compressor engineered as a unit; solid fuel injection.

1924 Large 4500-psi compressors for ammonia synthesis (still operating).

1927 Centrifugal pipeline pump; mechanical shaft seal.

1928 Barrel-type hot-oil charging pump for refineries.

1930 First compressor for 15,000 psi on commercial scale.

1931 Close-coupled Motorpump.

1931 First centrifugal gas pipeline compressor, "canned" with 3000-hp motor.

1933 Famous XVG gas-engine compressors combined multiple power cylinders and compressor cylinders on single frame.

1933 First non-lubricated compressors.

1935 Channel Valves set new standards for compressor valving, unmatched to this day.

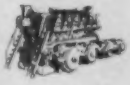
1937 Complete line of vertically-split centrifugal process pumps.

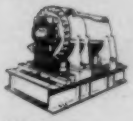
1940 First fluid cat-cracker main air blower.

1947 First high-pressure centrifugal compressor for gas transmission

1949 First centrifugal gas compressor for cat-cracking.

1952 First turbo-charged gas-engine compressor, the 2000-hp KVS.





1954 First centrifugal compressor for 2000 psi.

1955 Compressor built for 35,000 psi on commercial scale.

1958 Highest-pressure centrifugal pump —6500 psi.

Ingersoll-Rand

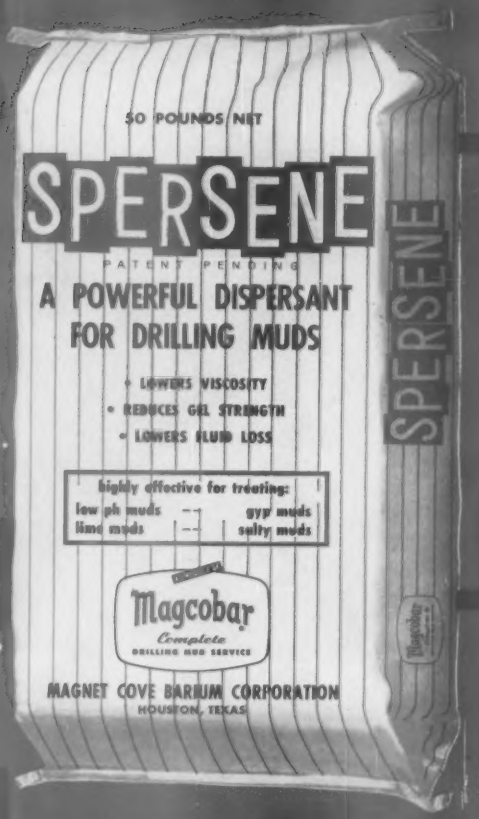
14-882 11 Broadway, New York 4, N.Y.

In engineered products, there's no substitute for *experience*

Now

SPERSENE

Magcobar's *new* all-purpose dispersant cuts costs *in any kind of mud*



another *well done*

Spersene, a very versatile thinner, performs well in any mud. Its powerful thinning action combined with low cost make it a unique chemical for treating any drilling mud. You need no longer stockpile a number of dispersants at your well to meet different mud conditions. Now, you can simplify mud treatments with this new all-purpose dispersant and cut mud chemical costs, too.

Spersene costs less when you buy it; costs much less when you use it. As the tables show, Spersene lowers viscosity more effectively, at less cost, than any of today's leading thinners. This means a lower cost per barrel with Spersene. When projected to well volume, it means surprising savings. Whether you are using high or low pH mud, gyp mud, lime mud, or seawater or brackish mud, laboratory tests prove that Spersene

	Amount (pounds)	MATERIALS	Average Cost (Cents)	VISCOSITY (Yield Point-lb./100 ft.^{2})
gyp muds	1	Spersene	16.5	7
	1	Thinner A	18.5	14
lime muds	3.0	Spersene	49.5	6
	3.0	Thinner A	65.5	16
low pH muds	1	Spersene	16.5	8
	1	Thinner A	18.5	12
	2	Thinner B	20.0	20
	1	Thinner C	18.0	18
	1	Thinner D	17.0	31
sea water muds	4	Spersene	66	1
	4	Thinner A	74	3

is more efficient on basis of costs than any other dispersant. And it is very stable against the upsetting effect of salt.

Spersene is one more specific Magcobar solution to the problem of high drilling costs, one more development from the Magcobar laboratories that will increase your profit through more economical drilling. From spudding in to total depth, you'll find that the right products *used right* by Magcobar engineers can cut your drilling costs, too. Write for the new bulletin on Spersene.

Wherever your drilling operations, you can use Magcobar engineering and products. There are more than 500 stockpoints in the U.S. and Canada. Elsewhere, write Foreign Operations, P. O. Box 6504, Houston, Texas

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They Say—

Australian tank holds record

Dear Sir:

We have noted with interest an article appearing in the issue of your Journal dated May 25, 1959, in which you state that Tidewater Oil Co. has put in the world's largest floating roof tank at their Delaware refinery (p. 112).

This is, in fact, not correct, as we have had the privilege of fabricating and erecting a 200-ft. diameter Horton floating roof tank for our client, Bitumen & Oil Refineries (Australia) Ltd., whose refinery, incidentally, was the first to be constructed in this country. This tank has been completed and successfully operating for more than 12 months.

For your information we would advise that this company is the licencee in Australia for the Chicago Bridge & Iron Co. who designed the floating roof to which we refer.

A. Gluckman
Bernard-Smith (Pty.) Ltd.
Alexandria, Australia

More of the same, please

Dear Sir:

We have read with great interest your wonderful editorial, "There's Only One Way Left to End Oversupply," in the June 22 issue of the Journal (p. 63).

We little people hardly know how to express our gratitude to one with your intestinal fortitude to tell the truth as we all know it.

It is only through one of your stature that corrections such as you advocate will be made. Keep pounding home the devastating effect in the industry of such uncontrolled states as Kentucky, Illinois, and the Four Corners area.

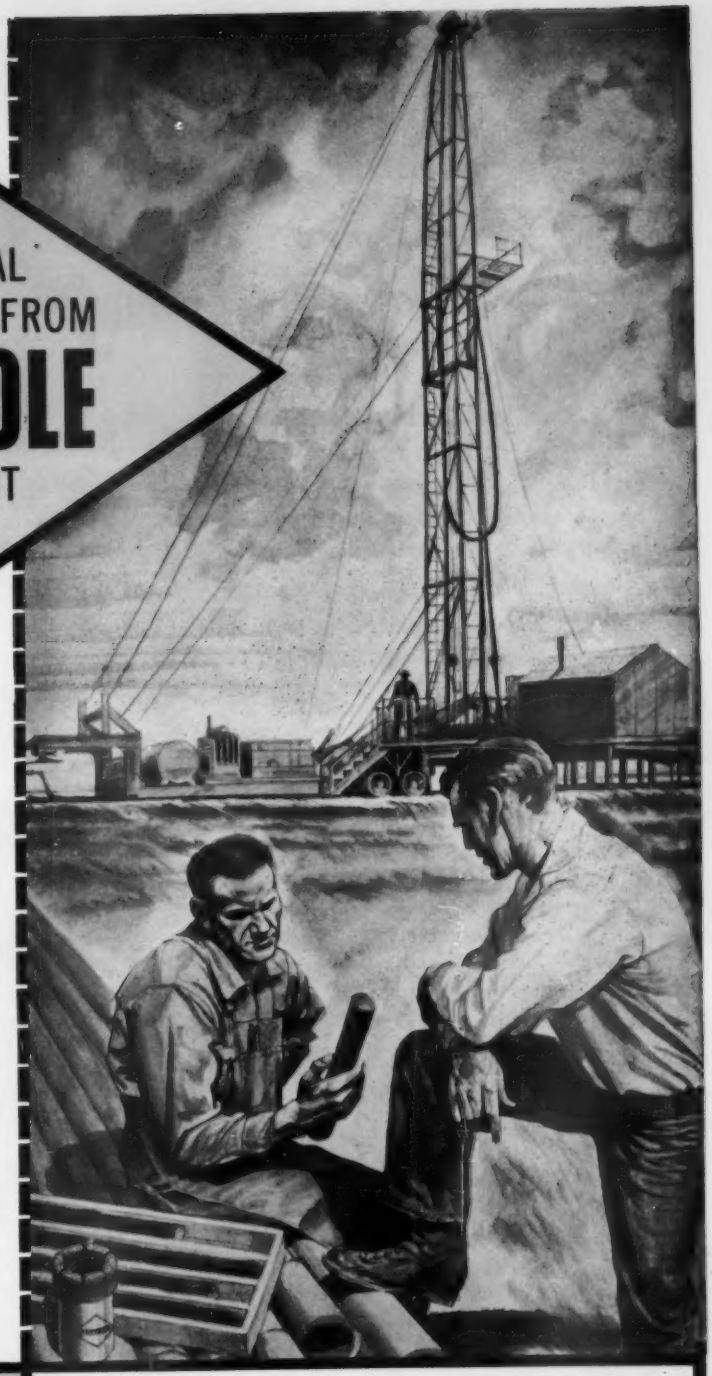
Let us read more such editorials.

Remember, do not leave out the refining branch. Any incentive or compulsion to secure production within limits of market demand applicable to producers must apply equally to refiners if stability is to be hoped for.

In the same issue your Newsletter touched upon the advantages gained by certain states from the imports-control plan. Would it not be proper, both from the standpoint of economics and fair play, for you to start the crusade of having the Federal Oil Import Administration deny allocations to any facility within such states hav-

DIAMONDS MEAN...

ECONOMICAL PERFORMANCE FROM SLIM HOLE EQUIPMENT



There is a need for a cheaper way to find oil, and slim hole drilling seems to be one answer. Over-all well costs are lower, and well completion costs are considerably less. The use of diamond bits with economical slim hole equipment provides even greater savings — especially in a deep hole operation. Recent successes have further upheld this idea. The diamond bit, having no moving parts, achieves maximum footage and longer bit life, even with the higher rotational speeds common in slim hole drilling. By its ability to stay on bottom in hard formations, the diamond bit reduces costly round trips. The excellent cutting action of diamonds is equally good in large or small bits, and, as the cost of a diamond bit depends on the carat weight of the diamonds, the smaller slim hole bits will cost less.

The quality features of Christensen standard core barrels are incorporated in our special 3½" x 1¾" slim hole barrel. Our hydraulic wireline core barrel is also available for slim hole drilling. Remember, for your slim hole job, Christensen diamond bits and core barrels mean "Less Cost Per Foot."

For detailed information on our complete line of drilling and coring equipment for your specific job, contact Christensen Diamond Products

Diamonds Mean, "Less cost per foot."

CHRISTENSEN DIAMOND PRODUCTS

1937 SOUTH SECOND WEST • SALT LAKE CITY, UTAH

HIGHEST OCTANE BARRELS

From Davison Catalysts

more high octane gasoline . . . and higher octane numbers . . . are produced by Davison Catalysts than any other in the world.

When it is realized that Davison Catalysts give more barrels of gasoline per pound of catalyst . . . more gasoline per pound of coke . . . higher stability and better stripping, plus higher attrition resistance . . . and more alkylation feed, *then* you know the reason why more refiners say "Davison" for gasoline cracking.

Too, it costs less to use Davison Catalysts. Experience reveals lower stack losses, greater heat and steam resistance, lower catalyst inventories. Call or write today for the most practical answer to your catalyst needs.

W.R. GRACE & CO.
DAVISON CHEMICAL DIVISION
BALTIMORE 3, MARYLAND
Dept. 403p

ing no conservation laws for oil regulations?

Such a stand would not only help all concerned but would be a big move toward correcting present inequities.

G. T. Granger
Vice President
Danaho Refining Co.

Misnamed discoverer

Dear Sir:

We wish to apologize for the delay in directing your attention to a mistake in the April 13, 1959, issue of The Oil and Gas Journal, but it was called to this company's attention only recently.

On page 156 of this issue, W. A. Wegman 1 Whitesides, C SE¼ NW¼ 16-10s-9e, Itawamba County, Mississippi, is shown as the discovery well of an unidentified new gas field located 1½ miles southeast of Beans Ferry gas field discovery well.

The 1 Whitesides is actually situated 1,113 ft. east of the west line and 440 ft. north of the south line SW¼ NW¼ 16, and is well within the confines of Beans Ferry gas field as designated by Mississippi State Oil and Gas Board.

Discovery well of this field was drilled and completed in Section 7 and by the time 1 Whitesides was completed other gas wells had already been drilled and completed in Sections 8, 9, 14, and 18, leaving no doubt that 1 Whitesides is within the producing limits of Beans Ferry gas field. Structural contours drawn on both the Evans gas sand and the Lewis gas sand confirm this fact.

Walter E. Sistrunk
Agent
Hyco Oil Co.
Jackson, Miss.

Unusual method praised

Dear Sir:

I want to compliment you on running the two interesting articles on electrical surveys in your issues of June 8 and 15 (OGJ, June 8, "Exploration Problems?—Electrical Survey May Do the Job," by C. A. Caswell, p. 232 and OGJ, June 15, "Here's What Surface Electric Records Can Tell You About Drilling Horizons," by George O. Williams, p. 154).

During the past 8 years I have had occasion to compare some of Mr. George O. Williams' predictions with results obtained by drilling and have been favorably impressed by the results.

For years men have tried to find a sure-fire method for locating oil

...why not try this Banking connection in oil-rich Canada?

Test it . . . try it . . . see how it works. That's the American and Canadian way of coming to a decision.

And that's why we are anxious to have you *try* our special banking services for oil and gas men before you decide on establishing a Canadian banking connection. Our experienced Oil and Gas Department in Calgary is close to all phases of this growing industry, knows trends and credit standings and qualified distributors of equipment. We can give you up-to-date facts and figures about Canada's great natural gas industry.

Whatever your banking problem or need involving Canadian oil and gas, we'd like the opportunity to help you solve it. Instead of just talking about our facilities and service, we're saying "see for yourself."

With more than 500 branches coast to coast, including all the major oil fields, "The Bank" is in a unique position to give you on-the-spot banking help and information on the oil and gas industry.

Take advantage of this demonstration offer. Get in touch with us today. Send for your copy of our map showing Western Canada's oil and gas fields and pipelines—plus Toronto-Dominion branches in the area.

THE TORONTO-DOMINION BANK

Write, call or wire Mr. W. F. Sadler
Oil and Gas Department
114 8th Avenue, W., Calgary, Alberta

Head Office: Toronto, Ontario
New York Agency:
28 Broadway, New York 4, N. Y.

New automatic custody transfer system measures precisely flow of incoming oil at DX Sunray's West Tulsa refinery

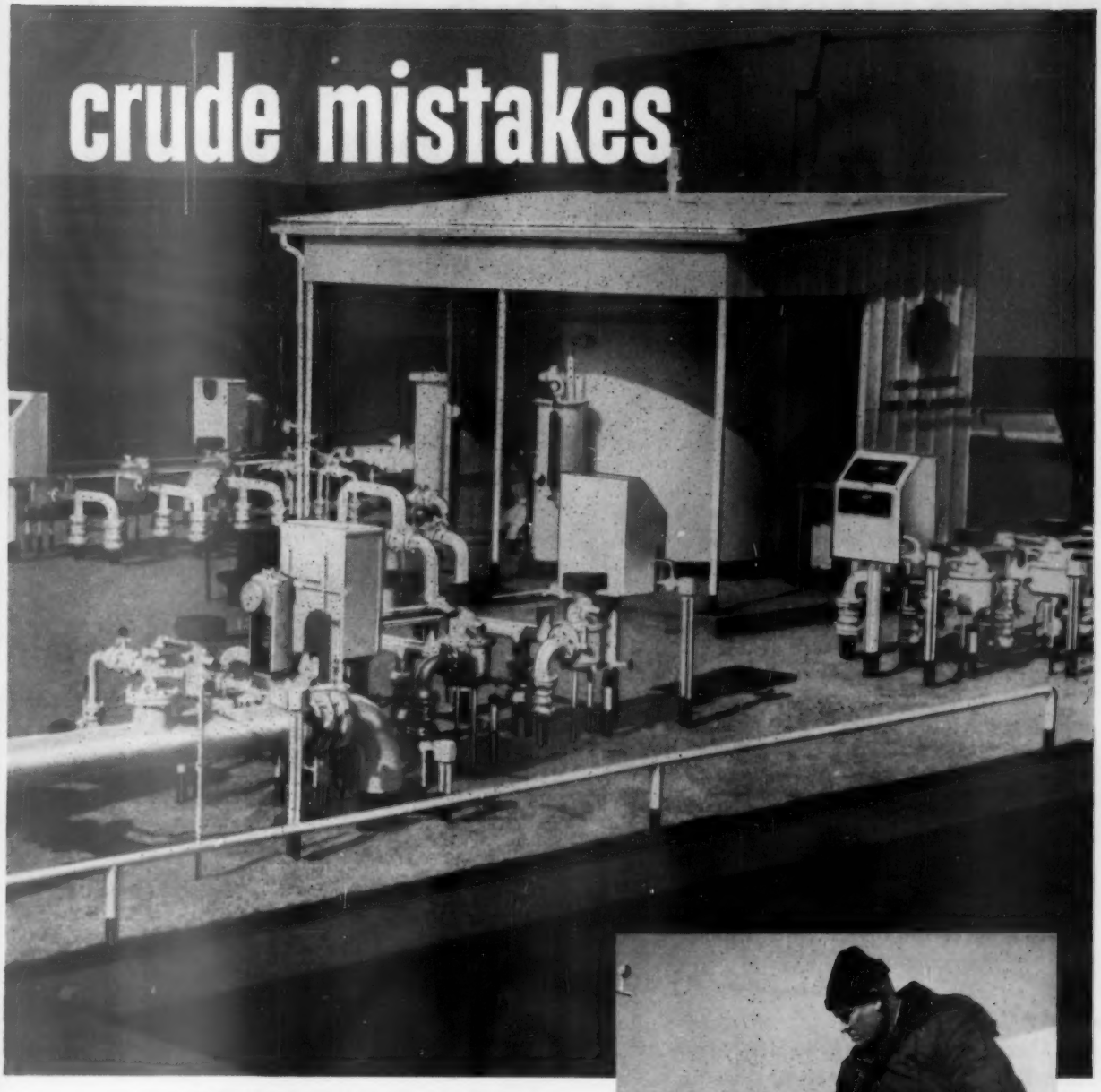
For a new measure of accuracy at this Oklahoma refinery, Mid-Continent Pipe Line Company and DX Sunray Oil Company looked to an A. O. Smith engineered meter system.

Four banks of positive-displacement type A. O. Smith meters (14 in all) receive 80,000 barrels of crude a day and register the amount to an accuracy within hundreths of a percent — all with automatic temperature compensation. More efficient than old tank-gauge methods too! With A. O. Smith meters there's no need for round-the-clock surveillance.

Large-volume A. O. Smith meters are also sure-cures for growing pains. For example, the ACT system at West Tulsa is so designed that it can be enlarged to handle additional flow capacity at any time by simply adding more meters — no need to buy up real estate for future expansion. Other plus advantages include release of measurement tankage for storage . . . faster, less complicated throughput . . . reduced capital investment . . . slashed tank filling and breathing losses.

For the complete details on how you can duplicate this success, contact your A. O. Smith meter man or write direct.

crude mistakes



COMPACT WITHOUT CRAMPING — Although this meter station handles four streams of crude totaling 80,000 barrels per day, the complete ACT layout occupies a plot only 50′ by 80′. Mid-Continent Pipe Line Company officials credit the reliability and accuracy of the system to A. O. Smith's design simplicity.

FIGURES DON'T LIE — A. O. Smith meters print a permanent, tamperproof record of each transaction. No more mistakes . . . no more disputes. Here H. C. Kindy, station operator at West Tulsa, checks a meter on a crude oil stream arriving from the Hominy area.

Through research . . . a better way

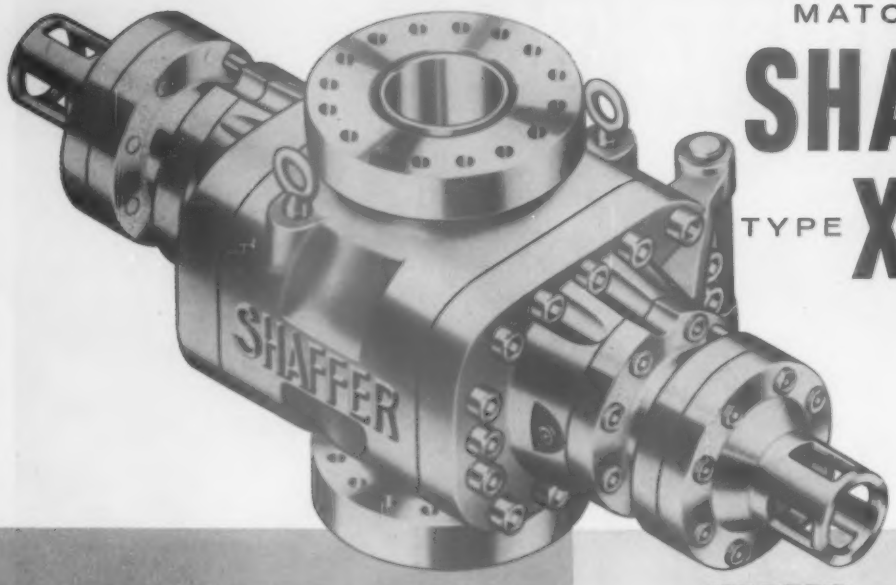
A.O.Smith
CORPORATION
Smith-Erie Division

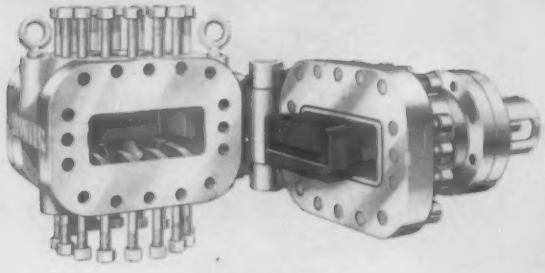
Factories: 5715 Smithway St., Los Angeles 22, California; Erie, Pennsylvania. Offices: Atlanta 5, Ga.; Chicago 3, Ill.; Houston 2, Texas; Los Angeles 22, Calif; New York 17, N. Y.; Oakland 21, Calif.; Tulsa, Okla. Canada: Toronto 12; Vancouver 1. A. O. Smith INTERNATIONAL S. A., Milwaukee 1, Wisconsin, U. S. A.

NOTHING in Blowout Preventers

MATCHES THE

SHAFFER TYPE XHP





THERE'S FAR MORE to building a high pressure blowout preventer than just meeting a pressure rating. But if pressure rating is your first consideration, take a look at the kind of *extra high* pressures the Type XHP can handle . . .

- **7-1/16" Bore Size—22,500 PSI Test Pressure, 15,000 PSI Working Pressure!**
- **9" and 11" Bore Sizes—15,000 PSI Test Pressure, 10,000 PSI Working Pressure!**

But That's Only Part of the XHP Story.

Although it has an extra high pressure rating, the Type XHP is not clumsy to service nor cluttered in its design.

TO CHANGE RAMS or service the ram compartment you simply unbolt and swing the end doors open. And there's the ram on one side for easy access—the open ram compartment on the other side for checking or service.

Best of all, you don't break hydraulic lines or lose hydraulic fluid each time you open the XHP. Hydraulic lines are built into the body—*and the hinge pins*—for leak-tight operation whether the door is open or closed.

AND, OF COURSE, the Type XHP has such other Shaffer advantages as QUICK-DRAINING RAM COMPARTMENTS, with the rams traveling on guide ribs high above any mud or sand that may collect in the compartment bottoms . . . and COMPLETELY ENCLOSED DESIGN with no exposed operating parts to become jammed or damaged by timbers or objects falling into the cellar.

COMPARE feature by feature and you'll find that nothing on the market equals the Type XHP for high pressure work combined with operating dependability and simple maintenance.

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THIS FREE 12-PAGE BROCHURE gives you complete facts and figures on the Shaffer Type XHP. Write or phone your nearby Shaffer representative for your free copy!

and gas. With oil "running out of our ears," we may have reason to be thankful that a 100% successful method of finding oil and gas has not been discovered.

It is nice to know that The Oil and Gas Journal will tell its readers about the progress being made in methods of discovery. As time goes on perhaps our economy will be better prepared to cope with an improvement in discovery rate.

U. R. Laves
Consulting Geologist
Oklahoma City

Extremely interesting . . .

Dear Sir:

The articles on electrical surveys in the June 8 and 15 issues were extremely interesting.

I would like to find out more about this type of survey . . .

William H. Lang
Geological Department
Cities Service Oil Co.
Bartlesville, Okla.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

JULY

27-31 University of Minnesota, continuation course, techniques of chemical infrared spectroscopy, Minneapolis.

AUGUST

3-7 University of Minnesota, continuation course, chemical interpretation of infrared spectra, Minneapolis.

6 Southern Gas Association, American Gas Association, public relations roundtable conference, Heidelberg Hotel, Jackson, Miss.

7 Southern Gas Association roundtable conference on pipeline operation and maintenance, St. Anthony Hotel, San Antonio, Tex.

10-13 Society of Automotive Engineers, national West Coast meeting. Hotel Georgia, Vancouver, B. C.

14 Southern Gas Association, transmission management conference, Sheraton-Dallas Hotel, Dallas.

10-28 Louisiana Polytechnic Institute, Lou-Ark section of AIME, graduate summer session in reservoir engineering, Louisiana Polytechnic Institute, Ruston, La.

12-15 Billings, Mont., Geological Society, tenth annual field conference, Disturbed Belt area of northwestern Montana, registration, August 12, Great Falls, Mont.

23-26 American Institute of Electrical Engineers, sixth electrical conference of the petroleum industry, Wilton Hotel, Long Beach, Calif.

24-25 North Dakota Oil and Gas Association, annual meeting, Grand Pacific Hotel, Bismark, N.D.

24-26 West Virginia University, annual Appalachian gas measurement short course, Morgantown, W. Va.

26-28 Pennsylvania Grade Crude Oil Asso-

NEW
WELL LOGGING
PACKAGE
CUTS COSTS...
PROVIDES EXTRA
INFORMATION

HYCALOG

CONTINUING RESEARCH FOR LOWER COST EXPLORATION

Continuous chromatographic monitoring and analysis of gas shows . . . *along with recording of principal drilling functions* . . . are combined in Hycalog's new GR-FDR package. And automatic operation permits the use of this equipment with *only one* attendant.

The package includes *two complete recording networks* . . . HYCALOG GAS CHRONOFRAC and a hot wire detector. One monitors methane content of mud gas samples and analyzes shows; the other records total combustible gases.

Added to this is the MARTIN-DECKER recording network which automatically measures and records the following drilling functions: weight on bit, pit level, pump pressure, and pump speed. (Recording of other functions such as torque and rotary speed are optional).

A *single* operator compiles and forwards daily all recorded data along with the log of any shows encountered.

With the new GR-FDR package you are sure of getting *round-the-clock* information at a cost far below regular well logging service.

Write for facts on the GR-FDR package. *And, while you're at it, ask about* HYCALOG V-DOOR *diamond drill bits.*

Hycalog, Inc.
505 AERO DRIVE
SHREVEPORT, LOUISIANA
BRANCH OFFICES IN PRINCIPAL OIL PRODUCING AREAS
DIAMOND CORING • DIAMOND BITS • WELL LOGGING • CORE ANALYSIS

FOR ⅛ TO 1½ INCH BRANCH CONNECTIONS

MARK

CUT

WELD

NEW W-S TeeLet SLASHES TEE COSTS 50% OR MORE!

The new W-S TeeLet replaces conventional Tees of cast or malleable iron, welded or forged steel . . . requires fewer stock sizes. Available in sizes from ⅛ to 1½" IPS, TeeLets are fully machined from forging quality solid steel bars and adapt to run-pipe sizes to 36". They require no additional joint strength calculations for any ASTM A-53 or A-106 Grade B run-pipe of Schedule 40 or 80.

What about cost? A size-by-size comparison with conventional Tees shows TeeLets average less than 50 per cent of the cost you now pay. A W-S TeeLet, with screwed, socket-weld or butt-weld ends, requires no shaping, fitting, beveling or extra alignment. You can connect to the run-pipe at any point. Short heights mean easy inspection of the attachment weld or back-weld, if desired.

A W-S TeeLet costs less to buy, less to install than anything you can buy or make. For complete information, prices, and names of distributors, write: *Forge and Fittings Division, H. K. Porter Company, Inc., Box 95, Roselle, N. J.*

FORGE AND PORTER FITTINGS DIVISION

H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

ciation and Pennsylvania State University, twenty-first technical conference on petroleum production, Penn State campus, University Park, Pa.

27 Oil Centennial Day, Titusville, Pa.

SEPTEMBER

9-11 Pacific Coast Gas Association, annual meeting, Ambassador Hotel, Los Angeles.

9-12 Intermountain Association of Petroleum Geologists, annual field conference, western high Uintas, registration, September 9, Provo, Utah.

10-12 Magic Plains Oil Exposition, Borger, Tex.

14 American Petroleum Institute, University of Texas, seventh session of school of pipeline technology, Lee College, Baytown, Tex.

14-16 Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston.

15-16 American Gas Association, Southern Gas Association, eleventh annual accident prevention conference, Dinkler Plaza Hotel, Atlanta.

16-18 Wyoming Geological Association, field conference, Big Horn Basin, registration, Cody, Wyo.

16-18 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

17 Natural Gasoline Association of America, Rocky Mountain regional meeting, Wyoming-Gladstone Hotel, Casper, Wyo.

20-23 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Rice Hotel, Houston.

21-23 Columbia University, oil refinery workshop on passive element analog computers, Engineering Building, Columbia University, New York.

21-25 Instrument Society of America, annual instrument-automation conference and exhibit, International Amphitheater, Chicago.

23-24 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

24-25 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division annual meeting, Roosevelt Hotel, New Orleans.

27-29 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Leamington, Minneapolis.

27-30 American Institute of Chemical Engineers, national meeting, Hotel St. Paul, St. Paul.

29-30 Western Petroleum Refiners Association, management seminar, Western Hills, Waggoner, Okla.

28-Oct. 1 American Welding Society, fall meeting, Sheraton-Cadillac Hotel, Detroit.

29-Oct. 1 National Association of Corrosion Engineers, western region conference, Bakersfield Inn, Bakersfield, Calif.

OCTOBER

1-2 National Association of Corrosion Engineers, southeast region conference, Jacksonville, Fla.

2-3 Association of Desk and Derrick Clubs of North America, eighth annual convention, Hilton Hotel, San Antonio, Tex.

4-7 Society of Petroleum Engineers of AIME, fall meeting, Memorial Auditorium, Dallas, Tex.

5-7 American Gas Association, annual meeting, Conrad Hilton Hotel, Chicago.

5-7 National Association of Corrosion Engineers, northeast region conference, Lord Baltimore Hotel, Baltimore.

5-10 Society of Automotive Engineers, national aeronautic meeting, aircraft manufacturing forum, and aircraft engineering display, The Ambassador, Los Angeles.

7-8 Western Petroleum Refiners Association, fourth annual stream pollution and waste disposal conference, Broadview Hotel, Wichita.

7-10 Rocky Mountain Association of Geologists, eleventh annual field conference, Saratoga Inn, Saratoga, Wyo.

8-9 California Natural Gasoline Association, annual fall meeting, Huntington-Sheraton Hotel, Pasadena, Calif.

8-10 American Association of Petroleum Geologists, Southwestern Federation of Geological Societies, second annual regional meeting, Coliseum, Lubbock, Tex.

8-10 Exploration Drilling symposium, sponsored by University of Minnesota, Colorado School of Mines, and Pennsylvania State University, University Park, Pa.

8-11 Louisiana Gulf Coast Oil Exposition, Lafayette, La.

11-13 American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

11-16 American Society for Testing Materials, Pacific area national meeting, Sheraton-Palace Hotel, San Francisco.

12-15 National Association of Corrosion Engineers, south central region conference, Cosmopolitan Hotel, Denver.

13-14 Seventh Annual Gas Measurements Institute, National Guard Armory, Liberal, Kans.

20-22 American Standards Association, national conference on standards, Sheraton-Cadillac Hotel, Detroit.

20-22 National Association of Corrosion Engineers, north central region conference, Cleveland.

20-22 American Society of Mechanical Engineers, American Society of Lubricating Engineers, lubrication conference, Sheraton-McAlpin Hotel New York.

22-23 American Institute of Mining, Metallurgical, and Petroleum Engineers, Los Angeles Basin section, fall meeting, Huntington Sheraton Hotel, Pasadena, Calif.

23 Natural Gasoline Association of America, southern regional meeting, Carlton Hotel, Tyler, Tex.

26-27 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

26-27 Independent Natural Gas Association of America, annual meeting, Westward Ho Hotel, Phoenix.

26-28 Society of Automotive Engineers, national transportation meeting, La Salle Hotel, Chicago.

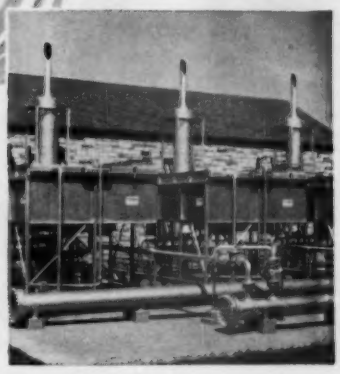
28-29 Western Petroleum Refiners Association, annual question and answer session on refining technology, Rufus Garrett Hotel, El Dorado, Ark.

28-29 Armour Research Foundation of Illinois Institute of Technology, annual computer applications symposium, Morrison Hotel, Chicago.

28-30 Society of Automotive Engineers, fuels and lubricants meeting, La Salle Hotel, Chicago.

28-30 American Association of Petroleum Geologists, Mid-Continent regional meeting, Broadview Hotel, Wichita.

Putting a 50 Billion cu.ft. Genie Back in its Bottle is a Big Job!



Young HIGH CAPACITY HC® UNITS

Handle Cooling Requirements for Laclede's Underground Gas Storage Project at St. Louis

Putting billions of cubic feet of natural gas back into an underground storage field takes a bit of doing. In this case the "Genie" is mastered with the help of Young coolers. The gas is compressed to 330 psig and cooled, then compressed to 630 psig and cooled again. The compression is accomplished by three Ingersoll-Rand 660 hp gas-fired compressors. Three Young HC Units handle the cooling of the gas in both stages and, in addition, cool the engine jacket water and lube oil of the engines. Young HC Units are noted for their excellent design and rugged construction. They are capable of meeting a wide range of cooling requirements and are invaluable where water is not readily available or in short supply. If you have a cooling or condensing problem, consult Young Radiator Company. Their wide experience is at your service.

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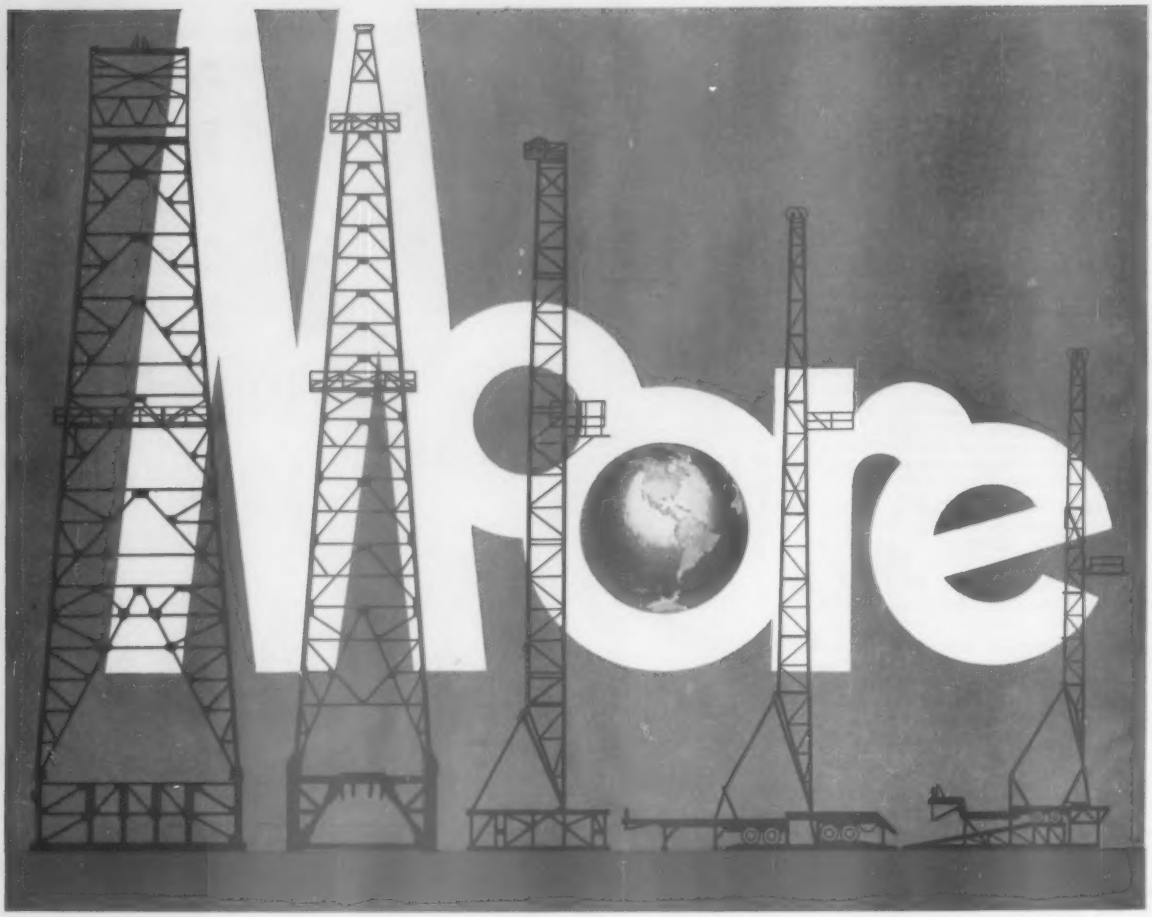

A TYPE AND SIZE STRUCTURE FOR EVERY DRILLING REQUIREMENT

LEE C. MOORE masts have been used for drilling in the bleak Arctic regions where structures must withstand actual wind loads up to 100 m.p.h. and where special housing was furnished for protection of personnel and equipment against extreme cold.

Our trailer-mounted units have provided the maximum portability required of drilling equipment for transporting over rough desert terrain.

Lee C. Moore multiple well derricks have made it possible to drill a series of wells from one setting of the derrick on over-water platforms.

We have designed drilling structures to break down into sections of appropriate size and weight for transporting by helicopter and conventional aircraft into otherwise inaccessible jungle areas.

The continuing program of study and research conducted by our design engineers assures the drilling industry of structures best suited to specific requirements.

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the Journal said...

50 years ago

July 20, 1909

Oklahoma's available gas supply placed in excess of 1 billion cubic feet daily. Oklahoma Natural Gas Co., Tulsa, controls 300 million cubic feet daily. Indian Territory Illuminating Oil Co. (Cities Service) is largest single owner.

The Texas Co. lays second 6-in. oil line from Humble to Sour Lake, Tex., to handle increased deliveries through Oklahoma to Humble 8-in. trunk line, newly looped north of Dallas. New 52-mile project to double capacity of coastal end of system.

Discovery of 31°-gravity oil in 334-ft. well drilled for water in northwestern Bastrop County, east of Austin, Tex., excites wildcatters in oil prospects in this section of the state, far removed from production.

25 years ago

July 26, 1934

Denver Producing & Refining Co.'s 1 Adah Noe wildcat in Caddo County, Oklahoma's deepest test and world's deepest oil production, flows 150 bbl. daily by heads with pipe still stuck in hole. Total depth is 11,230 ft., and producing zone at 9,900-10,000 ft.

Prolonged drouth and scarcity of water for drilling forces shutdown of 70% of rotary operations in North Texas' Wichita Falls region.

Plans laid for 50,000 visitors at 4-day celebration next week of Diamond Jubilee of Oil, dedication of Drake Well Memorial Park, and first national petroleum exposition at Titusville, Pa.

10 years ago

July 28, 1949

Pan American Petroleum Corp. and Root Petroleum Co. merge in newly formed Pan American Southern Corp., headquartering at New Orleans with exploration, producing, pipeline, and purchasing activities directed from Shreveport.

National Military Establishment confirms reports of discovery of first commercial gas in Alaska. Discovery well (2 South Barrow), 6 miles south of Point Barrow, is rated at 4,000 to 5,000 M.c.f. daily from depth of 2,505 ft.

Great Lakes Pipe Line Co., operator of largest product pipeline system, to spend $55,000,000, doubling capacity to 176,000 bbl. daily. Expansion calls for laying 1,450 miles of looping lines, and installation of additional pump stations and tankage.

JOURNALLY SPEAKING

Whodunit

IT'S A standing question in our shop, as in any publication office, just how much readers are interested in who wrote the material we print.

Every writer, professional as well as amateur, likes to see his name at the top of his printed piece in what, in journalistic lingo, is known as a byline.

But do the readers care whodunit? There's never been any hard and fast answer to that—as you may have noticed if you've paid any attention to the policies of various newspapers and magazines. Some are full of bylines, others never use any.

Here on the Big Yellow Book we have a selective policy. First off we'll make it plain that all contributed articles carry bylines (unless for some special reason the author requests anonymity). Its the staff-written material where the selectivity applies.

This midyear review and forecast issue "which adds up the score and tells what's in store" is a good example of how this policy is applied.

At least half our staff had some hand in working up this mass of special material and getting it in shape to print. It would be virtually impossible to divide up all the credits and to list exactly who did what, and it would look a little silly to try it. So there aren't any bylines.

We assume that you'll assume that it's a staff job—that the whole staff worked on it and that the staff as a whole stands behind it. Individual authors names on the various segments might actually detract from the prestige or authoritativeness by suggesting that it was just one man's research or opinion.

You can assume (and correctly) that all of the statistical computations and conclusions were made either by or under the close supervision of our economics editor. That's what he's hired for. You should also assume that such things as the scoreboard on wells drilled and rundown on wildcatting were worked up by the staff in our exploration department. That's their job all year around.

Likewise it should be obvious that our three staff artists and two presentation editors put in many hours preparing the charts and arranging the pages. And that perhaps a dozen other people pitched in to help assemble and organize different parts of this special material.

And since all of this is more or less routine to their regular work, we don't assign any byline credit.

We give staff bylines only where the man went to some unusual effort to write an article outside of his regular routine, or where he is such an authority on the subject that his byline carries real weight, or where his writing includes some personal analysis that may not necessarily reflect the judgment of the entire Oil and Gas Journal.

You can see how this works in almost any issue. For instance, this column always carries a signature because it is the personal views of an individual staffer, whereas the Editorial carries no byline because it is the official opinion of the Journal as an entity.

Likewise our Washington editor's name appears on his weekly column of opinion and interpretation, but not on his much bigger volume of copy that is routine reporting of news happenings.

Our Exploration Section opens each week with a page of personal opinion, interpretation, or comment bylined by either our exploration editor or one of his assistants, but nobody on the exploration staff gets a byline on the many pages of reports on wildcatting throughout the world.

Similarly our economics editor signs his page of personal interpretation, but there are no bylines on the routine material in the Statistical Section.

So that's our policy. Where there's no byline you can assume that the piece was written by one (or often by several) staff member as part of his regular job and that The Oil and Gas Journal is saying it. Where there is a staff byline it signifies that the writer is giving his individual conclusions.

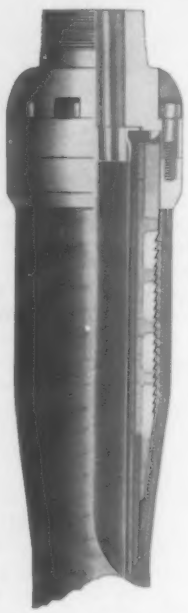
You'll notice we haven't used a single name in this whole column about names. That won't please some of our staffers who would like to get credit for what they have done on this midyear issue.

But what we're trying to say is that we don't use names just to please the authors, but only where we think it will help the reader to know whodunit.

—*Henry D. Ralph.*

Wherever oil men work, they depend on

More use per dollar



Hose detail and coupling with Lip-Lok seal

RAY-MAN ROTARY HOSE

TROUBLE-PROOFS YOUR RIG

Special high-tensile steel cable wire reinforcement, precision wound under tension, makes Ray-Man CBL Rotary unequalled for strength, flexibility and safety. Because it is flexible without being bulky, Ray-Man CBL Rotary Hose is easier to handle and make up on the rig . . . resists kinking and accidental crushing in moving from location to location. Once you're rigged up, Ray-Man holds steadier in the derrick without whipping—even under the high pressures of deep drilling operations!

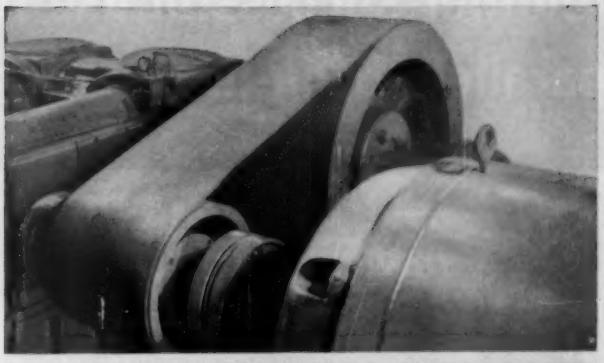
Ray-Man's streamlined, built-in coupling adds to the safety of using Ray-Man CBL Rotary Hose on your rig. It's specially designed without protruding lugs or flanges that cause fouling, and features R/M's leak-proof "Lip-Lok" seal that actually tightens under pressure to prevent dangerous—and costly blowouts! With Ray-Man's oil-proof tube for drilling-in with oil or oil-base mud, you've got the safest, easiest handling rotary hose for *all* methods of drilling.

For details of how you can get the longest, trouble-free service at the lowest cost per foot drilled . . . "More Use per Dollar" . . . write for Oilfield Hose Bulletin M651.

OTHER RUBBER PRODUCTS FOR THE PETROLEUM INDUSTRY

MUD PUMP INTAKE HOSE • VIBRATION HOSE • SHIP AND BARGE LOADING HOSE • TANK TRUCK AND TANK CAR HOSE • PROPANE HOSE • FUEL OIL TRUCK HOSE • FIRE HOSE

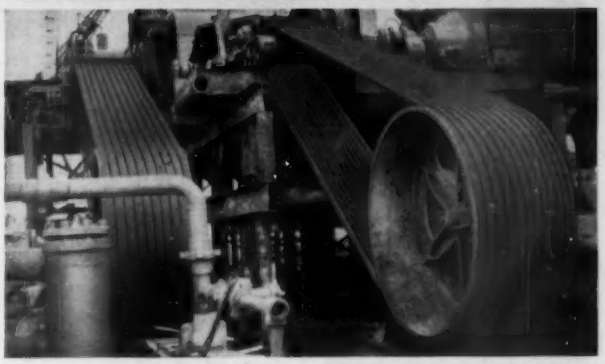
R/M Products



R/M POLY-V® DRIVES

No other drive puts as much extra push in deep hole drilling as the exclusive, patented R/M Poly-V! Delivers up to 50% more power capacity than a V-drive of equal width . . . or equal power in as little as ⅓ the width. Single unit belt design eliminates belt matching problems in the field . . . reduces field inventories. Just *two* belt cross sections meet every heavy duty drive requirement. Write for Poly-V* Drive Bulletin M141.

**Poly-V is a registered Raybestos-Manhattan trademark.*



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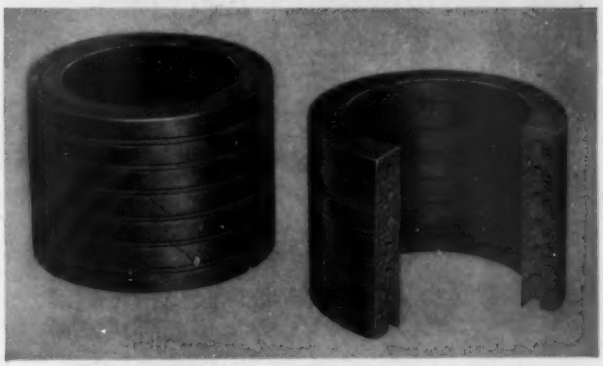

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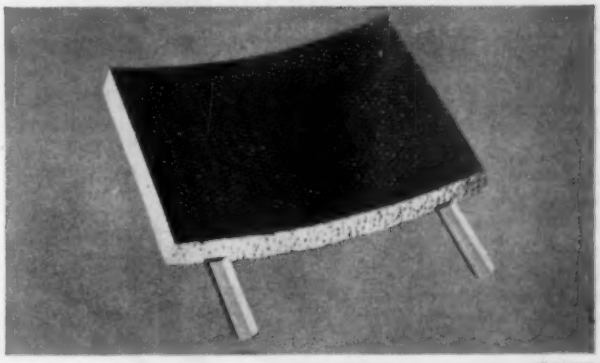

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FEATURES

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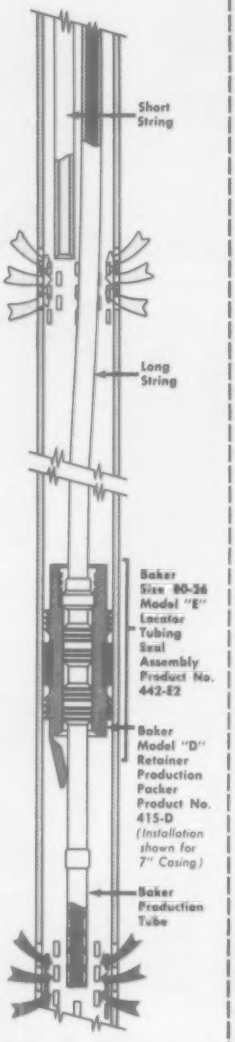
Short String
Long String
Baker Size 80-36 Model "E" Locator Tubing Seal Assembly Product No. 442-E2
Baker Model "D" Retainer Production Packer Product No. 415-D (Installation shown for 7" Casing)
Baker Production Tube

Permits removal of either string independently of the other regardless of sequence. Full-Opening (Tubing I.D.) Long String to lower zone.

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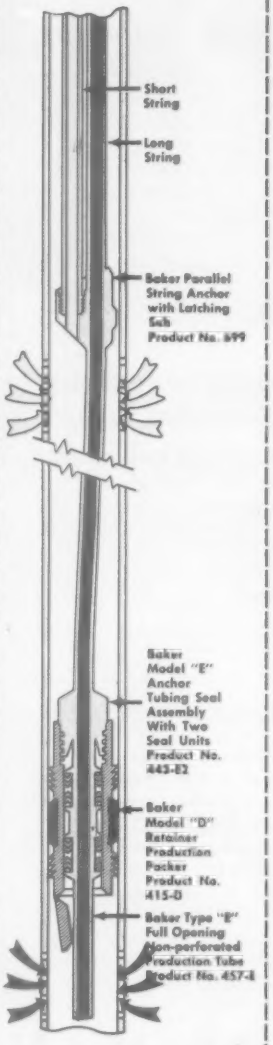
parallel
string
SHORT STRING ANCHORED


Short String
Long String
Baker Parallel String Anchor with Latching Sub Product No. 699
Baker Model "E" Anchor Tubing Seal Assembly With Two Seal Units Product No. 443-E2
Baker Model "D" Retainer Production Packer Product No. 415-D
Baker Type "E" Full Opening Non-perforated Production Tube Product No. 457-E

Permits removal of either string independently of the other, however long string must be run first. Short string pulled first. Full-Opening (Tubing I.D.) Long String.

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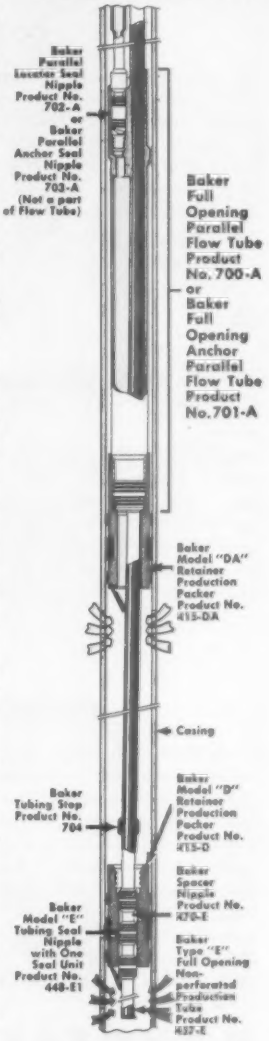
parallel
string
TWO-PACKER HOOK-UP*

**Ask for details of "Retrievable Upper Packer" installations, and other parallel string hook-ups.*


Baker Parallel Locator Seal Nipple Product No. 702-A or Baker Parallel Anchor Seal Nipple Product No. 703-A (Not a part of Flow Tube)
Baker Full Opening Parallel Flow Tube Product No. 700-A or Baker Full Opening Anchor Parallel Flow Tube Product No. 701-A
Baker Model "DA" Retainer Production Packer Product No. 415-DA
Casing
Baker Tubing Stop Product No. 704
Baker Model "D" Retainer Production Packer Product No. 415-D
Baker Spacer Nipple Product No. 470-E
Baker Model "E" Tubing Seal Nipple with One Seal Unit Product No. 448-E1
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The last-half outlook depends on performance

WHAT'S WRONG with the oil industry is pretty well symbolized by two figures on the first half of 1959: Demand up 6%, supply up 11%. Result: High inventories and low prices.

That is something of an oversimplification. In the first half of 1958 demand fell 5% and supply fell 10%, so a true statistical comparison would require many explanatory footnotes. There are reasons why the supply increase this year should have been somewhat higher than the demand increase—but not nearly double.

The industry's performance last year shows that it can adjust to a diminishing market. Its performance this year suggests that it can't contain itself in an expanding market.

NOW AT MIDYEAR the industry is at a teetering point. Its actions during the next couple of months will determine its direction for many months thereafter.

On page 133 of this issue is the Journal's semiannual forecast of supply and demand—a judicious weighting of the views of the top economists throughout the industry.

It estimates that during the remainder of this year total demand for petroleum will be only about 3% above last year. While 1958's second-half pickup was fair, an additional 3% adds up to considerably less than a boom.

The supply forecast is not what ought to be done. It is an estimate of what the industry probably will do if it restrains itself as much as can be expected by the most charitable assumptions. This contemplates a lot more restraint and realism than was shown the first part of this year.

New supply, under these assumptions, will total less during the last half than during the first half. Imports are definitely scheduled to take the whole cut plus a little more.

So the increase left for domestic crude production averages only 60,000 bbl. per day. Spread among the nation's producing fields, this is minuscule. And even this increase should be postponed to winter.

Refinery runs, under the same assumptions, are to increase only slightly more than crude production—and this increase very definitely is not needed until winter.

PRODUCT PRICES at the moment are stiffening. This should indicate a general belief that supply will be held in check and stocks reduced. But if the firmer price tone simply triggers abandonment of caution it will do more harm than good.

Our "best-that-can-be-expected" forecast contemplates closely curtailed production and refining activity for at least the next 3 months. If it is fulfilled, the industry will end the year not in excellent shape but at least headed out of the woods.

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East Texas Cut—End of a Cycle

• Other buyers react slowly to Atlantic's 20-cent reduction, but they're expected to meet the cut. Producers express concern at sign of weakness in market, but crude experts view move as merely an adjustment.

THE LAST of the current round of crude-price cuts rather than the beginning of another round.

That's the way most crude-oil men judge the reduction of 20 cents per barrel for East Texas crude posted last week by Atlantic Refining Co.

Other purchasers immediately put the East Texas price structure under study but were slow to match the cut. Some report privately they also expect to meet the posting.

The reduction to $3.05 cents per barrel caused widespread concern among producers because historically East Texas crude has been a kingpin in the crude-price structure.

For 2½ years East Texas field has had a flat price of $3.25.

It reached that pinnacle when European buyers were scrambling for Gulf Coast crude to meet the Suez crisis. At that time East Texas postings were raised 35 cents while most other crudes went up only 25 cents. Also since then most other Southwestern and Mid-continent crudes have had some reductions.

Hard to sell . . . For months there has been talk in the trade that East Texas crude was overpriced—or, as some preferred to put it, all other crudes were underpriced.

At any rate there has been a differential which has made East Texas crude difficult to sell.

The new price brings East Texas down to a competitive level and therefore is not expected to trigger a widespread cut in other crudes. Some observers do feel, however, that the 20-cent cut was bigger than necessary.

For instance, with a transportation charge of 10 cents, East Texas will now deliver into Houston at $3.15. West Texas Ellenberger crude, with a posted price of $3.01 and a tariff of 18 or 20 cents, delivers to Houston at $3.19 to $3.21. This gives East Texas an advantage of 4 to 6 cents.

What gives the action special significance is that for years a great many individual contracts have been tied to the East Texas crude posting.

These include some condensate postings in the Gulf Coast area, some processing deals for refined products, and some royalty payments to the Venezuelan Government on crude produced in that country. However, such tied-in prices are not nearly as numerous as they once were.

For many years—in fact until about 10 or 12 years ago—East Texas crude dominated the market in the Southwest. East Texas was the largest producing field in the United States. It was located close to refining and shipping centers, and its crude price was extraordinarily stable.

Also for many years East Texas crude was the most desirable crude in the country from the standpoint of refining characteristics. It gave a high yield of gasoline by straight-run distillation. It also was a fairly good lube-oil crude in spite of some asphalt content.

Picture changes . . . But this has been changed by the development of refining technology, the growth of other big producing areas in the Southwest, and the construction of big pipelines from West Texas to Gulf ports.

Modern refining processes get equally good gasoline yields from crudes that were once considered quite inferior to East Texas. And Ellenberger crude, for example, is now considered superior to East Texas for lube manufacture.

With gasoline now in surplus, few refiners will pay what amounts to a premium for high-gasoline-yield crude, and most purchasers recently have been "long" on East Texas crude.

The only advantage left to East Texas is its location—a 10-cent haul to Houston. But this, too, is slipping. Big pipelines can make a profit on tariffs of 20 or 25 cents per barrel from the far reaches of West Texas to Gulf Coast shipping and refining centers.

Production in East Texas field is currently around 128,000 bbl. per day, which is only about 5.3% of Texas' total crude production of something like 2,400,000 bbl. per day. So East Texas is no longer in the position of the big dog wagging the tail for all Texas crude. It is now just the tail and not big enough to wag the dog.

While producers are understandably alarmed at this latest sign of weakness in the crude market, crude-oil purchasers view the price cut as simply an adjustment. The reduction will bring East Texas into line with competitive conditions in the market and with the realities of relative crude-oil evaluations and refining realizations.

Atlantic's position . . . The Atlantic posting reduces the price on about 14,000 bbl. daily.

Atlantic officials report about 9,000 bbl. daily of this is Atlantic's own production. The rest is purchased from other firms or is contract oil bought for others.

These officials claim the fact that the cut falls heavily on the company's own production is testimony they consider it overpriced.

Opposition to the Atlantic action came from at least two quarters:

. . . Texas Atty. Gen. Will Wilson declared he plans an immediate investigation of the Atlantic price cut.

Wilson said he will determine if any Texas antitrust law is violated and added:

"We raise a warning flag for the entire industry, pointing out the danger of possible antitrust violations through concerted action. We cannot think of a more inappropriate time to reduce the price of crude. It is most shocking in view of the rigid curtailment of production by the Railroad Commission and the industry generally."

. . . IPAA President Gordon Simpson called the Atlantic action "deplorable and disturbing."

He said the cut "comes at a time when low producing allowables and rising costs seriously threaten the economic stability of the domestic petroleum industry. I hope it will not have a demoralizing effect on the industry's patient efforts to weather these unhealthy conditions."

TIPRO President Harry C. Jones also protested. In a telegram to Atlantic's Dallas office, he declared the price action "appears entirely without justification in the light of current industry conditions."

Reluctant Congress Looking for Gas-Tax

• A tax increase isn't dead, but the prospects are good that any addition to the load will be smaller than the President wants. At the moment, opponents are looking at other money sources to keep the road program going.

PRESIDENT Eisenhower's proposal for a 50% increase in the federal gasoline tax will have rough going in Congress.

Several influential members of the House ways and means committee are leaning toward other solutions to the highway-financing problem.

Although not ruling out any boost in the gasoline tax, their opposition indicates Eisenhower may have to settle for less than the requested 1.5 cents per gallon.

Privately, some members are talking of slowing down the road-building program and transferring money from the general revenue fund to bolster the nearly-depleted highway trust fund.

The president himself has implied that he would veto any plan to continue the big highway-building program at its present rate through deficit financing or at the expense of the general fund. He has spoken of a slow-down in construction as the only alternative to a tax increase.

Bond proposal . . . But one administration official spoke up last week in favor of either a smaller tax increase or revenue bonds in preference to slowing down the highway program.

The plan to issue interim bonds to keep highway construction on schedule, introduced by Sen. Francis Case (R-S. D.) was suggested by Rep. Hale Boggs (D-La.) as a possible alternative to a tax increase.

"What do you think of that suggestion?" he asked federal highway Administrator B. D. Tallamy, one of the administration witnesses at the ways and means hearings.

"Well, I personally think that it's better than nothing," replied Tallamy.

Under further questioning, Tallamy suggested a tax increase of less than 1.5 cents a gallon as another possible short-term solution.

Another committee member, Rep. Noah M. Mason (R-Ill.) suggested transfer of other highway-use taxes to the highway trust fund as "the sensible thing" to do. About $1.5 billion yearly paid by motorists in automobile excise taxes and other special levies now go for non-highway purposes.

Chairman Wilbur Mills (D-Ark.) and Burr Harrison (D-Va.) both intimated they would go for a tax increase only if it is trimmed below 1.5 cents.

While reaffirming his stand against the Eisenhower proposal, Mills gave no hint just how high a tax he thought would be necessary to pacify the administration.

Harrison, however, spoke in favor of a ½-cent increase for the remainder of the fiscal year. He pointed out that this would bring in enough revenue to prevent the federal Government from defaulting on payments to the states for projects already under contract.

Oil men on hand . . . Spokesmen for the oil industry were allotted 45 minutes during the 3-day hearings to present their views in opposition to a new gasoline tax.

James L. Beebe, Jr., representing the California Petroleum Marketers Council, urged Congress to prevent "freeloading" by the nonessential tobacco and alcoholic beverage industries which depend largely on the highway system for distribution of their products.

If automotive industry taxes were

Third Session Still Hasn't Settled Texas Taxes

THE TEXAS legislature waded into its third consecutive special session last week in its continuing struggle to solve a growing Texas financial crisis.

In the regular general session and two subsequent special sessions, the House and Senate have deadlocked primarily over the issue of added taxes on natural gas.

The Senate has adamantly held out for a tax bill providing most needed new revenue from selective sales taxes but including a 1% increase in the production tax on natural gas to 8% of value.

The House has refused to hike the gas tax on producers and insisted on levying a new tax which would fall on the pipeline purchaser of gas reserves dedicated under long-term contracts.

Even as the legislature battles into its third special session, it is still not clear which, if either, of these taxes will become law.

New bills reported . . . At midweek, the House tax committee reported out two tax bills which would raise $193,489,000 in new revenue over the next biennium.

One bill would provide $177,289,000 via a batch of new sales taxes, sales tax increases, and corporation franchise taxes.

The second, the severance beneficiary bill, would bring in an estimated $16,200,000 via a tax of 1.2 mills per M.c.f.

The latter has been passed by the House in various forms in previous sessions and subsequently beaten down by the Senate.

A House tax committee spokesman said the gas tax was written in a separate bill this time because "it was not the desire of the committee to endanger passage of a bill big enough to take care of the state's financial needs with a controversial tax."

Oil men disagree . . . Meanwhile, the industry split widens over who should pick up the new gas-tax tab.

The Texas Independent Producers and Royalty Owners Association came out with its strongest statement yet. In it, TIPRO said flatly that, if more gas taxes are inevitable, it should be the pipelines that pay them—not the producers and royalty owners.

"We are frankly appalled by the efforts of certain industry representatives to substitute a 1 or even 2% gas production tax (which would be an increase of 14 to 28%) in order to avoid any tax on gas pipeline companies."

Substitutes

shifted to the trust fund, he said, "we should have more than enough funds for highway expansion." He warned that any increase in gasoline taxes would be, in effect, "a poorly disguised austerity-at-the-wheel program for lower income Americans."

But they had plenty of moral support from a long line of witnesses representing trucking associations, the American Automobile Association, and other highway-user groups.

A spokesman for the American Automobile Association, expressing opposition to any increase in the motor-fuel tax, favored short-term revenue bonds to prevent this year's anticipated $500,000,000 deficit in the highway trust fund.

Edward V. Kiley, speaking for American Trucking Associations, Inc., proposed "loans" from the general fund to keep the program going. As an alternative, he favored revenue bonds.

The 1.5-cent tax as proposed by Eisenhower would remain in effect through fiscal year 1964. Administration officials estimate it would bring in about $724 million the first year and increase to about $950 million the last year.

Unless new revenue is provided or the highway program is slowed down, a deficit of about $3.9 billion is anticipated by mid-1964.

Oil Under Fish Hatchery? State Calls for Bids

GROUNDS of the Rifle Creek, Colo., fish hatchery are up for oil leasing. C. J. Gillaspey, Grand Junction, Colo., told the Game and Fish Commission that he believes the hatchery is part of an oil field covering 10,000 acres.

Gillaspey, who wants to drill 13 wells on the hatchery land, offered 25% royalty. But the commission is asking for other bids.

Thomas O. Kimball, game and fish department director, outlined several stipulations which the successful bidder must meet. The state will accept no less than 25% royalty; drilling must commence within 30 days; and there must be no pollution of hatchery waters.

watching WASHINGTON

Joe Reilly

• Just how temporary is "temporary" tax? . . .

CONGRESS is now seriously considering another "temporary" tax on gasoline.

According to the cynics, there's nothing more permanent than a temporary tax. But in the case of gasoline, there's reason to fear that the cynics will be proved wrong.

Almost without exception, temporary tax rates on gasoline in the past have had a very short duration. They remained in effect only until replaced by higher rates.

The federal Government levied its first general tax on gasoline in 1932. The rate was 1 cent per gallon. It was described as a "temporary emergency" levy and was to remain in effect not more than 1 year. A few months later, the emergency apparently having been resolved, the 1-cent rate was increased to 1½ cents.

This additional tax of ½ cent per gallon is an exception to the rule. It was not replaced, at least not immediately, by a higher tax. But it took a constitutional amendment to get rid of it. The rate dropped back to 1 cent per gallon on January 1, 1934, by virtue of Presidential Proclamation No. 2,063. This was the document in which President Roosevelt proclaimed the repeal of prohibition.

Even with liquor and accompanying taxes again flowing freely, the nation still had its share of emergencies. To take care of them, the temporary 1-cent gasoline tax remained in effect until 1940.

THEN THE RATE AGAIN ROSE to 1½ cents, where it remained until 1951, making it the most permanent of all federal gasoline taxes to date.

From 1940 to 1951, U. S. gasoline consumption nearly doubled. While revenue rose at a similar rate, it never quite caught up with the temporary emergency that had been detected by an alert Congress back in the early '30s.

So the rate was increased to what was then a record level of 2 cents per gallon. On paper, this looked like an increase of 33 1/3%. But, in dollars, it amounted to considerably more. Because of growing consumption, the 2-cent levy brought in about 2½ times as much revenue as the 1½-cent tax did a decade earlier.

Another emergency –a forerunner to the present one—developed in 1956. That was when Congress authorized construction of the 40,000-mile interstate highway system. Cost of the program was estimated at about $27 billion.

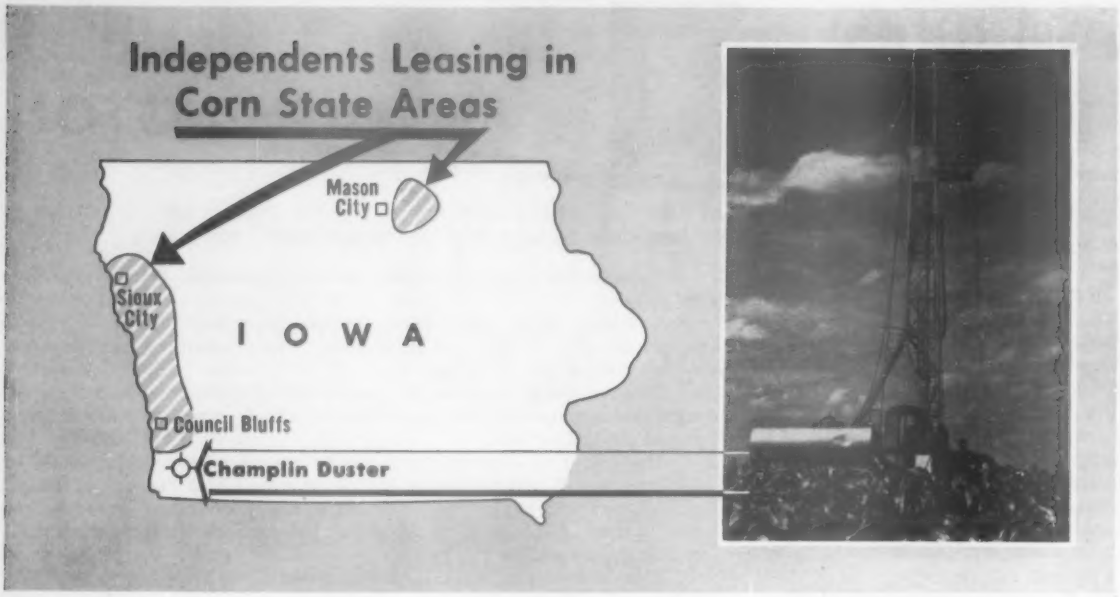
To help meet this emergency, Congress increased federal gasoline taxes by 50%, to 3 cents per gallon. The extra tax, being temporary, was to remain in effect until June 30, 1972.

THE ROAD-BUILDING PROGRAM was just getting well under way when Congress in 1958 decided to speed it up with an extra $400 million authorization. This was to ease a real emergency, the 1958 recession. In its haste to overcome the recession, Congress failed to provide extra revenue to finance the accelerated road program.

Soon, the proposed 40,000-mile system had become a proposed 41,000-mile system. Federal, state, and local highway officials had found time to study the plans more carefully, and they had discovered a need for many interchanges and elaborations not included originally.

Revised plans, with the help of inflation and a few other unforeseen developments, increased the cost of construction. By the time Congress came back to Washington last January, the $27-billion program had grown into a $40-billion program.

President Eisenhower had a novel solution for Congress. He proposed another 50% increase in the gasoline tax, to 4½ cents per gallon. Congress balked at first, but now seems ready to approve a compromise plan.



Dry Hole Even Boosts Iowa's Oil Play

• Champlin's duster reveals such good reservoir conditions geologists believe some big pools exist in the state. More holes now probably will be drilled this year north along the Missouri River.

Robert J. Enright
District Editor

IOWA is a good bet for the country's next new oil-producing state.

Leasing and lease trading have been active for several months in the Corn State. The tempo has quickened in the last few weeks.

Even a recent wildcat which was completed as a dry hole is adding fuel to the oil hunt. The well was the 1 J. N. Brown of Champlin Oil & Refining Co. Location was on a 15,000-acre block in Mills County on the Nebraska border in the southwestern part of Iowa a few miles southeast of Council Bluffs.

There are now good prospects that more holes will be drilled this year—probably to the north along the Missouri River.

The Champlin dry hole surprisingly was not so discouraging as it might have been. Drillers encountered thick formations for such shallow country. Porosity was very good all the way from 1,000 ft. to total depth of 2,236 ft. in the Arbuckle.

Champlin got only a slight oil show in the top of the Hunton of the Devonian. And the Hunton appeared to be the best section. But high porosities also were found in the Galena (Viola limestone), the St. Peter sand (Wilcox), and the Arbuckle.

With such favorable reservoir conditions, a Champlin geologist feels it is only a matter of time until someone hits the jackpot in Iowa.

Other independents now are hoping to do just that. Indications are that industry attention will shift to the north a bit to Woodbury, Monona, Harrison, and Pottawattamie counties.

Why the delay? . . . Prime impetus for the Iowa play appears to stem from recent successes in similar very shallow drilling areas in Kentucky, Nebraska, and Kansas.

Some prolific strikes in these areas, combined with the comparatively low cost of the shallow wells, are the lures. They are sufficient to overcome a reluctance by many operators to enter an unknown, as yet nonproductive area where there are serious exploration obstacles.

One of the biggest of these obstacles is the thick layer of glacial drift or fill which makes Iowa such a fertile corn state but, at the same time, hides most of what would otherwise be the region's surface geology.

This layer of gravelly, sandy clay blankets structures which otherwise would be easily visible. It averages about 150 ft. in thickness. Only a few very prominent structures poke through it. Some of these lie along the Missouri River Valley in the area of current top leasing interest.

At one time it was felt that good seimic pictures could not be obtained through the drift. This now has been largely disproved. But the misconception helped deter exploration in Iowa.

Another deterrent was the knowledge that even in the southern part of the state, the sedimentary section on top of the granite is almost certainly not more than 3,500 ft. thick.

In this rather thin section are cramped Pennsylvanian, Mississippian, Devonian, Silurian, Ordovician, Cambrian, and Precambrian rocks. Many geologists have felt in the past that individual formations might be too thin or that rocks in such an area might have lain on the surface too long to provide good oil source beds.

Reservoir conditions . . . The Champlin well, and predecessors, have pretty well proved, however, that good reservoir conditions exist.

All that is required is to find this kind of good reservoir rock with oil in it.

This may take some doing. But several competent geologists think it will come—and that the time isn't far off if any reasonable amount of drilling is carried out.

One of them puts it this way:

"There are no good reasons why there should be no oil in Iowa. Zones that produce in other areas are there and with sufficient thickness and porosity to produce. Of course the section is thinning out as you go north and at some point oil will play out—but this shouldn't be so in the southern portion of the state at least.

"I definitely feel that Iowa some day will be a producing state."

Another points out that the southwestern portion of the state falls in the Forest City basin and that this basin produces oil commercially in Richardson County, the extreme southeastern Nebraska county, and in Brown County and other counties in extreme northeastern Kansas. There's no good reason why oil shouldn't be found, he says, on the Iowa side of the Missouri River as well as in the Kansas-Nebraska side.

Furthermore, he said, it is not impossible that Iowa could come up with big oil producers. The drill has penetrated sands and limestones in several wells 50 to 200 or more feet thick—and with very good porosity.

This geologist expects some of the oil interest and money now funneling into the shallow play in Kentucky to spill into Iowa. Any decent strike in Iowa, he thinks, "would be sure to kick off a big play. There are lots of hickies (structures) in the southwestern part especially—some of them with as much as 200 ft. of closure. And if one of them produces, you can bet there'll be a boom."

Not entirely unknown . . . Though Iowa is as unknown and foreign to some oil operators as Ecuador, there are a few who have done exploratory work in certain areas.

Ohio Oil Co. for instance, is probably better acquainted with extreme southwestern Iowa than any other operator.

Ohio has had its hand in this area of Iowa for nearly 20 years. It did a large amount of core drilling in 1940-42 to get through the glacial till and check structure. And it drilled a duster in Fremont County east of Nebraska City in 1941. The well, in Section 23-68n-41w, was bottomed in Precambrian rocks at 3,378 ft.

Ohio over several years cored a wide area with holes ranging up to 450 ft. It picked out a large number of structures but after its initial failure did no more drilling.

There's No Bonus, But Iowa Still Is a Good Gamble

CERTAINLY the Iowa part of the Forest City basin is worth a wildcat gamble.

Drilling density throughout the basin is only one exploratory well per 250 sq. miles. In Iowa, it's much less. Some good oil fields have been found in the Nebraska and Kansas portions, and oil has been known to migrate across state lines.

Iowa's eager for an oil well, but not as eager as some other nonproductive states. At each of the last two sessions of the Iowa legislature, bills have been introduced posting a reward for the first commercial well. Both times, they were defeated. Amounts suggested ranged from $25,000 to $75,000.

Georgia, of course, dangles the biggest carrot before the country's wildcatters with a $250,000 come-on, but nobody's claimed it yet.

Shows and seeps . . . In 1951, M. P. Hall Co. drilled its 1 John Johnson wildcat to total depth of 2,058 ft. three counties to the north in Harrison County.

This dry hole, in Section 17-81n-44w, found gas shows in the upper Mississippian at about 450 ft., in the Devonian at 900 ft., and in the Galena dolomite (Viola) at 1,530 ft. It got fluorescence in the Silurian at 1,225 ft., in the Ft. Atkinson of the Ordovician at 1,500 ft., and in the St. Lawrence dolomite of the Cambrian near total depth. Most encouraging, however, was a fair show of black oil in a vuggy, brown Ordovician dolomite at 1,657 ft. just above the St. Peter (Wilcox) sand.

Major geologic features . . . Major structural feature in the region is the Nemaha Ridge-Table Rock uplift which separates the Forest City basin on the east from the Salina basin on the west.

The ridge-uplift feature trends due north as it crosses the Kansas-Nebraska line then turns to the northeast beginning in northern Johnson County, Nebraska. It crosses into Iowa in Fremont County.

Dominating the geologic picture to the north in the area of Mills and Pottawattamie counties is the Richfield arch. The arch extends southeast from Douglas County, Nebraska, through Sarpy County. It approaches the Iowa border at the Sarpy-Cass county line, then bends to the south in Cass County.

The latest test. . . The latest company to take a crack at drilling in Iowa, Champlin did so in the area probed by Ohio Oil Co. and on a structure found by that company during its core-drilling program.

The area had lain relatively dormant since Ohio's dry hole in Fremont County. The Mills County block was reassembled by Ohio in 1954. Champlin took a farmout from Ohio on 7,000 acres and blocked out another 8,000 in early June before spudding its 1 Brown high on the structure in Section 7-71n-41w.

The 1 Brown placed the top of the Cherokee at plus 539 ft., the base of the Kansas City at plus 679 ft., the top of the Argentine lime at plus 860 ft., the top of the Stanton at plus 919 ft. It topped the Devonian at 1,062 ft. and came out of it at 1,510 ft. The Galena was picked at 1,868 ft., the St. Peter at 2,027 ft., and the Willow River (equivalent of upper Arbuckle) at 2,056 ft.

The sole show, an oil stain, came in the top of the Hunton lime of the Devonian at 1,062 ft.

A drill-stem test of this zone developed a weak blow for one hour. Return was 327 ft. of water-cut mud. Initial flowing pressure was 47 psi., increasing to 154 psi. Final shut-in pressure was 358 psi. in 30 minutes.

Jack Hendrickson, chief geologist for Champlin, said the Hunton was the best-looking zone. "But we got a nice section of St. Peter sand—about 26 ft. with good porosity—and also thick sections with good porosity in the Viola and Arbuckle.

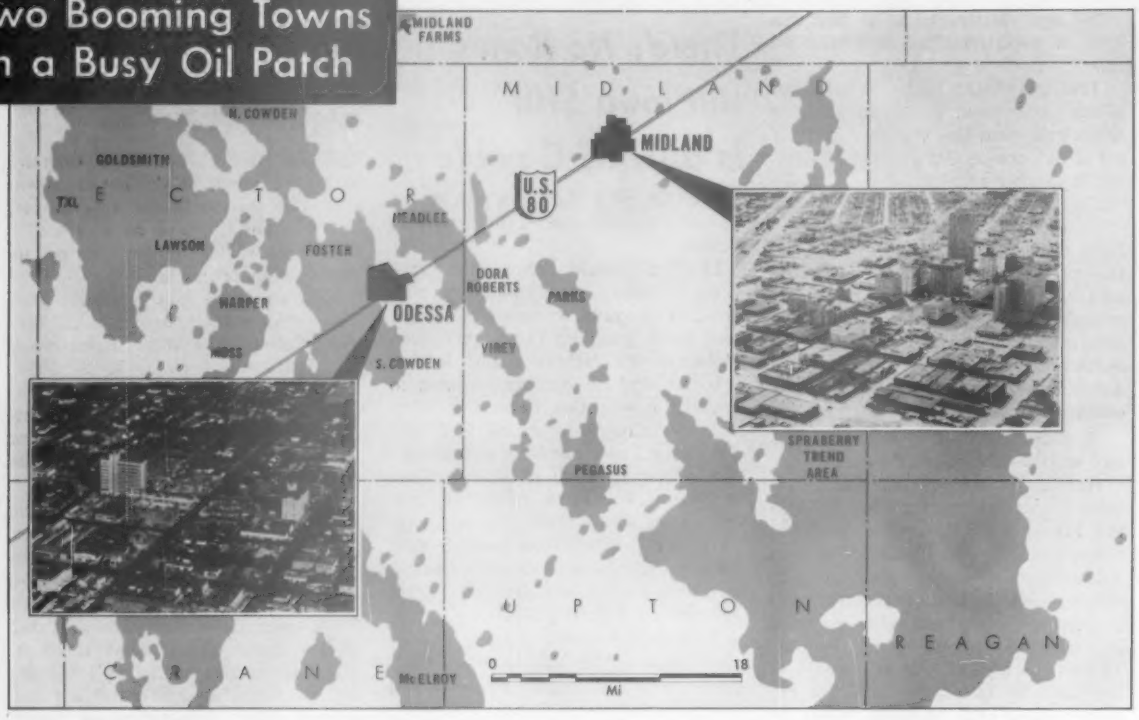
Why did Champlin tackle such a project? For one thing, Hendrickson said, Champlin has found shallow production in other areas profitable. Secondly, it could acquire a large acreage spread cheaply and drill it at small cost. "If the well had cost $100,000 we wouldn't have looked at it twice. But we had a chance to come up with something good at small cost. A dry hole in such an area doesn't knock a big hole in our budget."

Another Champlin geologist put it this way: "Oil hunting is sort of like a crap game. Usually you'll play the odds. But sometimes you'll think the time is right to tackle big odds and put a little more on the bet. That's what we did in Iowa."

Champlin lost its best.

But it and others feel that sometime, maybe soon, someone there is going to roll a natural.

Two Booming Towns In a Busy Oil Patch



What's Behind the Big Boom at Midland

- These two towns in the middle of the Permian Basin are destined to grow even more as major oil companies move personnel and decision-making to where the oil is being found.

By Ed McGhee and Howard Wilson

IF THERE should be some kind of contest among today's cities that were "Built by Oil," two side-by-side West Texas cities would divide a healthy share of the prizes.

Midland and Odessa together have compiled an arm-long list of "mosts" and "biggests"—most oil produced in the region, biggest oil reserve controlled, most oil firms represented, and on and on.

And still the towns mushroom. Both have virtually tripled in population since 1950.

Yet, while only an 18-mile, high-speed, four-lane highway separates them, the two cities are as different in personality as the Pentagon and Cape Canaveral.

Midland goes to the office in a white shirt and tie; Odessa arrives at the yard or store in a short-sleeved shirt. Midland owns the wells; Odessa produces them. Midland gets the contracts; Odessa drills the wells. Midland approves the purchase order; Odessa buys the tools and equipment.

The flatland area they serve was, a few years back, home only to cattle and the cowboy. Today its population is between 200,000 and 300,000.

New-style boomtown . . . Take a walk through Midland's newly sprouted business district.

The massive buildings, most of them erected in the past decade, disgorge at the noon and closing hours a horde of well-tailored men and women who manage and work in the West Texas division offices of such giants as Shell, Humble, Texaco, Gulf, Pan American, Magnolia.

They work for a myriad of independents who also have a stake in the oil yield of the surrounding counties. They work for dozens of companies directly related to the oil business—suppliers, servicing firms, geophysical outfits.

Midland today claims more than 600 oil and service companies, and most of them are located in this large cluster of buildings in the business district.

And construction goes on. Two buildings of 8 and 14 stories are being completed, and two others of 12 and 15 stories are under construction. Moreover, their space is being fully leased.

The Chamber of Commerce disdains its 1950 population figure of 21,713 persons. It claims today nearly 60,000.

And no one is in much of a position to argue—not when Texaco decides to move the Fort Worth division to Midland, Shell enlarges the Midland division territory, Humble moves part of its lease and land section from Houston to Midland, and a host of other companies follow the same decentralizing pattern—all within a period of months.

How they live . . . The average family income in Midland is a remarkable

ODESSA has become Permian basin's drilling and producing headquarters.

MIDLAND, with "big city" appearance, termed Wall Street of West Texas.

and Odessa

$7,500, and thousands make $10,000 and up.

This kind of wealth has made possible a city of wide, clean streets, uncrowded schools, nearly 1,000 acres of park land, and other recreational and cultural facilities that have taken the sting out of a transfer to the hot, windswept prairie oil center.

New residential areas, where air-conditioning is standard equipment, are growing swiftly to accommodate the influx of 400 persons a month.

Air travel serves as a quick link between modern Midland and other metropolitan areas of Texas and the nation. A new air terminal, serving both Midland and Odessa, is being built to serve the plane-minded oil population.

What's ahead . . . The future of Midland, as well as Odessa, is tied to oil, and there are no pessimists around. (See related story on p. 278).

The most conservative estimates put the Midland population at 100,000 by 1990, but this landmark is expected to arrive much sooner.

The Permian basin, for which Midland generally is the executive headquarters, is the country's largest—and most active—reserve of oil and gas. It produces 48.1% of all Texas and New Mexico production and 21.1% of the nation's total.

What guarantees Midland's future growth, however, is something more than oil reserves. It's the growing concept of decentralization in the oil industry.

No longer does the typical widespread producing empire operate chiefly out of New York, Pittsburgh, Houston, or Tulsa. The trend toward granting more authority to men in the field—the divisions and the districts—is building Midland today and will keep it built just so long as the Permian yield holds up.

Odessa's role . . . In 1920, Odessa had a population of 110.

In the decade that followed, Ector County got its first oil well, and the population multiplied to 2,407.

But Odessa's destiny was bigger than Ector County, and it soon began to emerge as the Permian Basin's drilling and producing headquarters.

Virtually every U. S. oil well supply firm has a store in Odessa. Practically every major drilling contractor in West Texas has a yard there.

Odessa has built its economy not only on producing oil but on processing it as well. A petrochemical complex has given the city an industrial turn and provides a sound base for future growth.

The population today is approaching 90,000 and should pass 100,000 easily in the coming decade. It is not uncommon for 40 houses to be completed in Odessa within a week.

A junior college recently built on the outskirts of town is now engulfed by new residential areas.

While downtown Odessa cannot

boast the big-city atmosphere that characterizes Midland, there is plenty of construction under way.

A new 14-story bank and office building was started this spring, and the new 250-room Lincoln hotel has Texas-size, 7-ft. beds.

The people . . . If Midland is the Wall Street of West Texas, Odessa is the hard-hat Main Street.

In doing the job that Midland finances, Odessa has acquired a solid citizenry of well-paid workmen who take pride in their city's spectacular growth, in its new well-scrubbed shopping centers, and its spreading residential developments.

Local merchants thrive because the people buy at home, but distances do not prevent an Odessa family from traveling long distances for pleasure. Boating, to the surprise of visitors, is a major sport in the semidesert Odessa region. Every weekend the cars pulling trailer boats move out for drives of 2 hours or more to the nearest bodies of water.

The ranching industry, once the life-blood of tiny Odessa, amounts to very little in the city's economy today, but the people still honor the past with the annual Sand Hills Hereford-Quarter Horse Show and Rodeo.

Odessa looks ahead with confidence. Its role as an oil processing and manufacturing city will grow, and the drillers in the Permian basin are still finding new reserves to keep the contractors and service companies busy for many years to come.

Tubing flattened . . .

into a ribbon and . . .

inflated on the job.

New Strip Tubing May Prove Major Innovation

A NEW light-wall seamless metal tubing that is vastly different than anything on the market will be produced on an experimental basis this fall.

The difference: It's shipped as a flat ribbon in rolls or on reels and then formed into tubing by inflating it at the point of use.

The new material will be manufactured at the Allen Park, Mich., plant of Wolverine Tube Division of Calumet & Hecla, Inc.

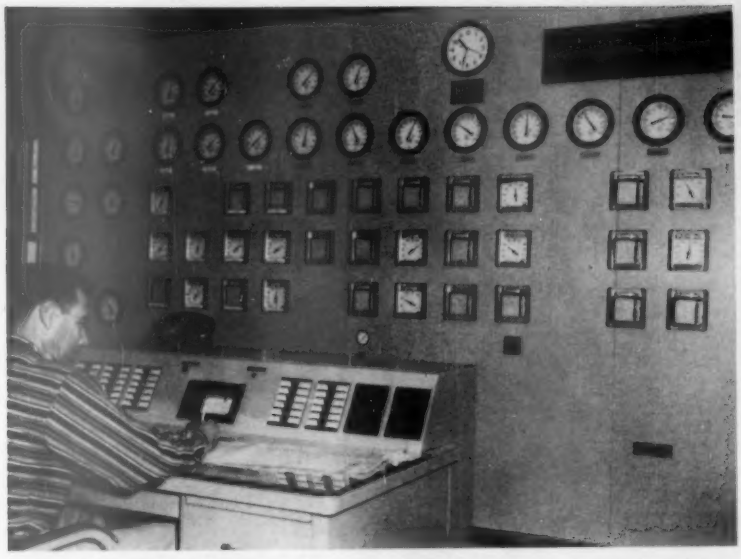
The product is known as "Strubing" (strip tubing) and C&H Vice President D. W. Blend claims it holds promise of major innovations in many industries, including petroleum refining and chemical processing.

Strubing can be made in sizes ranging from smaller than the lead in a pencil to a pipe large enough for a man to walk through. It can be as thin walled as household metal foil or as thick walled as conventional pipe.

Blend says strubing has two big advantages:

. . . Savings in shipping costs. Only the tube walls are shipped and not the "hole." It will be possible to ship the material in coil lengths of as much as 15,000 ft.

. . . Savings in production. The process—technically classified as cold rolling — provides an economical means of producing thin-wall tubing of materials and in thicknesses either unavailable or too expensive today.



CONTROL CENTER at Anchor's Tabasco plant features a control panel and temperature console. The panel has 26 pressure indicators and a total of 29 electronic loops. Of these, 16 are indicating loops, 2 information loops, and 11 recording-control loops. The console has 72 temperature-indicating points.

Automation Gets Boost

. . . for natural-gasoline plants from Anchor's experience with full electronic instrumentation at Tabasco facility.

ANCHOR Gasoline Corp. officials think the exceptionally smooth operation of their all-electric controlled Tabasco gasoline plant may start an industry trend.

The Tabasco plant, according to Anchor President Joe R. Wright, is the first gas-liquids extraction plant in the industry employing full electronic instrumentation.

He adds that this electronic installation is a major step towards the ultimate goal of a completely electric automatic extraction plant.

The Tabasco plant is located near Mission, Tex. It is a 40,000 M.c.f. daily facility using a combination refrigeration-absorption process scheme.

The Marsh Co., Tulsa, was consultant on the project. The Swartout Co. furnished instrumentation.

Why electronics? . . . Such elaborate and precise controls are unusual for a field-processing plant.

Their use is being dictated by two major factors:

. . . Efficient operation of a gas-liquid extraction plant is becoming more and more important as the value of the extracted liquid hydrocarbons increases.

. . . Exacting specifications for liquid products of the plants are now being made by the industry.

Thus at its Tabasco plant, Anchor faced the problem of getting a payout from a very lean gas while trying to meet the market demand for precision cut hydrocarbons and still keeping plant investment within reason.

This made it necessary to:

. . . Use an efficient process cycle to recover a high percentage of the propane from the lean gas.

. . . Incorporate other features to get higher operating efficiency and lower operating cost.

Wright said Anchor decided that electronic controls would be a factor in providing the higher plant efficiency and precision product cuts required.

The electronic controls allow the Tabasco plant to be run with only one operator per shift, plus a chief operator and superintendent. Such a small crew was deemed an absolute necessity if a satisfactory plant payout was to be obtained when processing lean gas.

Several other features reduced the investment required, including:

. . . Exclusive use of miniature instruments. They substantially cut the size of the control panel and the control house, thus reducing total cost of the control center.

. . . Prefabrication and pretesting of the control panel by Electric Specialties Co., Tulsa. The panel was delivered to the plant site ready to connect. This reduced the field instrument installation cost and the testing cost.

The start up . . . The operating crew previously had been trained with conventional pneumatic controls.

They were able, however, to complete the calibration and start the plant with no more difficulty than with a comparable pneumatic installation.

The Swartout automatic control system used at Tabasco requires a minimum of servicing at the plant site. Printed circuit cards and plug-in components are used. These can be replaced simply by slipping one card or component out and inserting a new one.

Parts inventory, as a result, is simplified and maintenance costs are reduced. Special training of personnel is not required to maintain the instruments. Also instrument downtime is held to the absolute minimum.

Process scheme . . . The Tabasco plant employs two absorbers.

One handles gas produced from the Edwin W. Pauley leases. The other handles the gas produced from the Atlantic Refining and Sinclair leases. Both gas streams are glycol dehydrated prior to absorption.

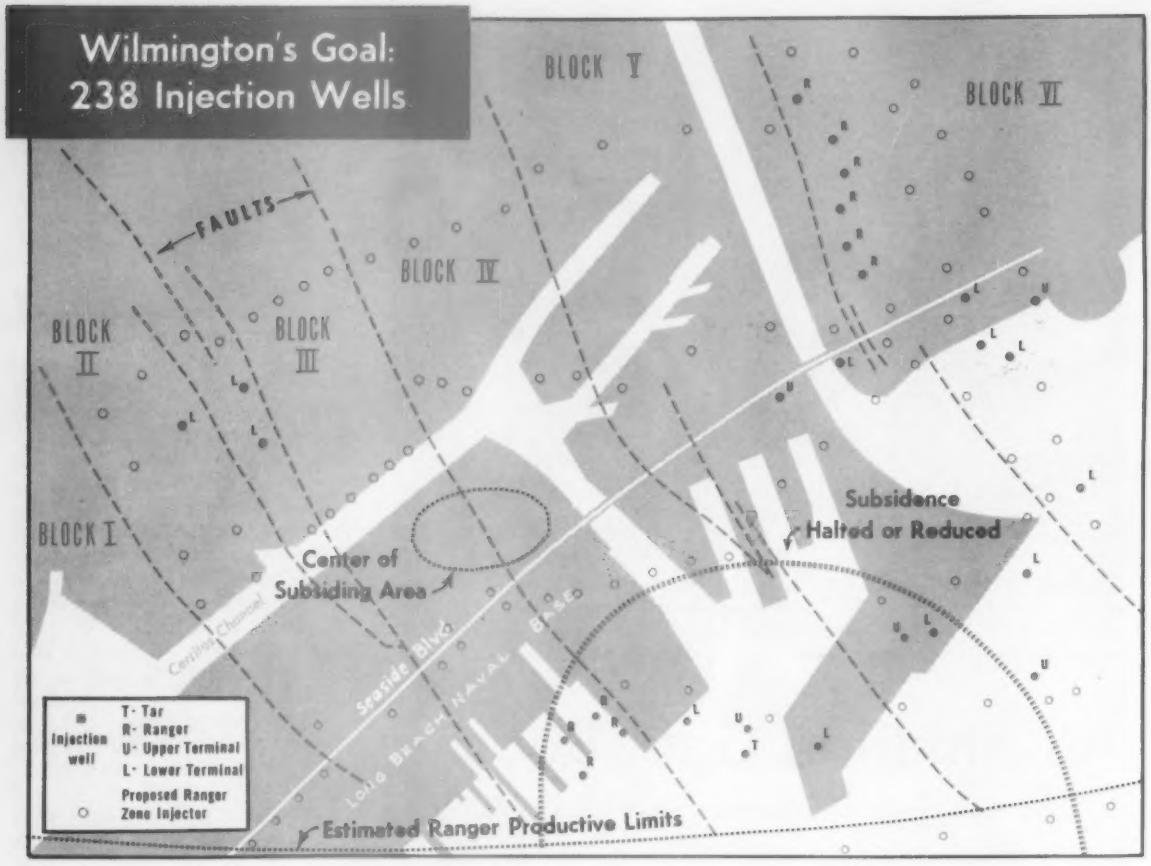
The dehydrated Pauley gas is commingled with absorption oil, and the liquids are extracted from the bottom of the Pauley absorber. This mixed stream goes through the main gas chiller before entering the primary absorber.

The Atlantic-Sinclair gas, after dehydration, is also commingled with absorption oil. The extracted liquids from its absorber pass through another coil of the main gas chiller before entering the primary absorber.

Lean absorption oil goes through a cold-oil exchanger and a lean-oil chiller before entering each absorber. Propane refrigeration is used, and a cold rich-oil flash is incorporated in the process. A rich-oil deethanizer and a dry hydrocarbon distillation-type still complete the processing.

Propane, butane, and natural gasoline are end products from this operation.

Anchor Gasoline is convinced that this method of cycling, plus the economies of the electronic instruments, have made a very efficient operation at the Tabasco plant.



Speed Is Watchword at Wilmington

• Putting a million-barrel flood into operation is tough, at best, but it's worse when the Government is threatening to shut in production if operators aren't quick enough. Principal problem: Legal requirements.

D. H. Stormont
West Coast Editor

THERE'S LITTLE doubt that one of these days soon Californians will be injecting a million barrels of water a day into Wilmington field.

The big question, though, is: When?

Present schedule calls for the flood to be in full operation within 9 months. And oil men and government folks alike are working hard to hit that target.

But right now it looks like a close race, with the odds just a little against the operators. And with the federal Government looking over their shoulder, it's enough to make oil men nervous.

What makes the timing such an urgent matter is the continued subsidence in Wilmington field.

Already $90,000,000 has been spent for remedial work. If the bowl-shaped sinking area drops another 10 or 15 ft., as predicted if it isn't halted, another $50,000,000 or $60,000,000 outlay would be needed for repairs.

And should the surface of the shipyard sink 4 ft. more, the Navy would have to abandon the $170,000,000 installation.

In recent months the fight against subsidence has lagged. But a big jump in water injection is due next month, and it's not impossible that California producers will meet their original timetable.

Because of the threat to the shipyards, the U. S. Government last month reactivated its suit which would shut in the entire Wilmington field.

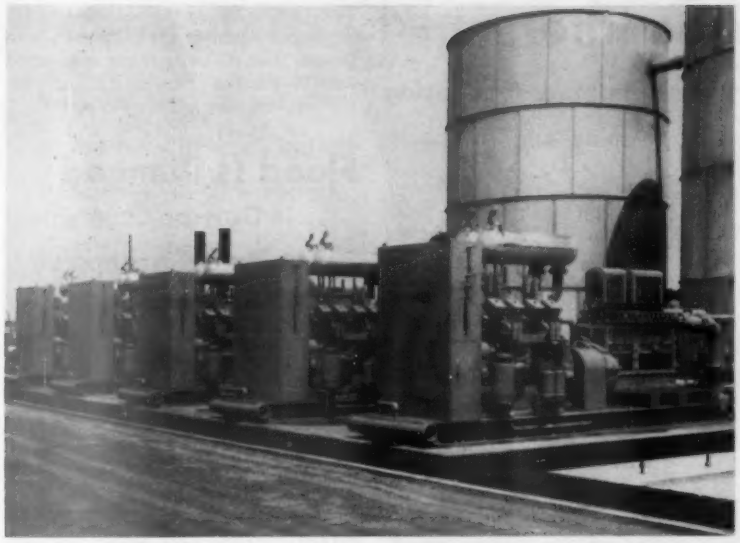
Wilmington operators were charged with not exerting sufficient effort to get the flood going. The time schedule they had set up called for some 400,000 bbl. of water to be injected daily during July. Actually only about 210,000 bbl. was being injected, the same volume which was being handled last January.

What's being done . . . Wilmington operators have not been idle, as they will explain in Federal Court on August 3.

Since the way was legally cleared last year by passage of the California Subsidence Act, injection rates have increased fourfold.

About 50,000,000 bbl. of water has been injected since last October, more than half of the total injected to date.

Almost all of the 6,800-acre field ultimately may be flooded, but initial voluntary efforts are confined to the crest and south flank. Separate floods



WATER-INJECTION system for halting subsidence at Wilmington field is pictured above. This is part of a water plant operated by Richfield Oil at Pier A in Long Beach.

will be carried out in each of blocks 2, 3, 4, 5, and 6 (map), with the entire operation controlled by the state oil and gas supervisor.

Water will be injected into the Tar, Ranger, and Upper and Lower Terminal zones, the four pays in which all compaction is thought to have occurred.

Both peripheral and up-structure injection will be used. The accompanying map shows most injection wells now in operation, and those planned for the Ranger zone. By January 1961 a total of 238 injection wells will be in use.

Contractors for the City of Long Beach, which owns about 40% of the area to be flooded, have five rigs at work drilling input wells. In addition, old oil wells are being converted to injectors.

The city is rushing the construction of plants which ultimately will supply more than 1,100,000 bbl. of ocean water daily. Because of its large interests, the city has assumed the job of supplying water for all projects. The capital outlay will then be recovered through an amortization charge in the price of the water.

The four city plants now in operation, three by Long Beach Oil Development Co. and one by Richfield Oil Corp., have a combined injection capacity of 279,000 bbl. daily. Four new plants being built, plus expansion of an existing plant, will boost this capacity about 600,000 bbl. They should be in operation by late this year, when the field-wide injection rate is expected to pass 500,000 bbl. daily.

Two of the plants will supply the water for blocks 2 and 3, where injection has lagged because of diversified interests. Both plants are of record size for high-pressure injection, one having a capacity of 297,000 bbl. daily and the other 157,000 bbl. Twelve shallow source wells will be required to supply them with brine.

Unitization progress . . . Except for block 6, where the three operators formed a cooperative project, operators have been seeking to complete unitization agreements.

Seven committees were organized by the producers in fault blocks 2, 3, 4, and 5 to inventory facilities and establish equities. In addition, four field-wide committees have been studying such over-all problems as taxation, geology, and oil and gas purchases.

Operators representing 96% of the production in blocks 2 and 3 are very close to final unitization. To expedite water flooding, however, earlier this month they agreed on terms of cooperative floods. Equities will be adjusted after a final few points have been worked out.

Under the new agreement the private operators waive rights to any damage that might arise from water injection by the city. They also agree to return to the city any oil which might migrate to private lands.

Effect of the pact will be a greatly speeded up program in the area where most subsidence has occurred.

Such cooperative pacts also probably will be followed in blocks 4 and 5. Primarily they will be used to expedite water injection. However, the prevailing legal opinion is that this step is necessary for the City of Long Beach in order that the legality of unit agreements can be established.

The city owns 40% of the production in block 4 and 91% of that in block 5. Holdings of Union Pacific Railroad Co., General Petroleum Corp., California Edison Co., and Richfield Oil Corp., combined with those of the city, are more than sufficient to set up unit operations.

All have signed "memorandums of intention to unitize and repressure," which contain their agreement to compulsory unitization if the voluntary agreement can't be worked out.

Effect of water injection already is being felt in the area where flooding has been under way longest (map). The three upper zones in parts of blocks 3, 4, and 5 now are receiving about 180,000 bbl. of brine daily. They have been at this level for only some 8 months but about 25,000,000 bbl. had been injected in the preceeding 5 years.

A survey of elevations in the harbor area last August for the first time revealed that the program was giving results. The subsidence rate in the vicinity of Pier A had been reduced. A second survey last February showed subsidence had been entirely halted in a 500-acre area and that the rate was reduced in 750 more acres.

Success of the program in this area has led subsidence control officials to predict that sinking will be halted in the entire area sometime between 1961 and 1964.

Slaughter Injection Asked

PAN AMERICAN Petroleum Corp. last week sought a Railroad Commission permit to start a gas-injection program in the San Andres under 4,400 acres of its leases in big Slaughter field of West Texas.

The company plans to inject about 1,100,000 cu. ft. of gas daily initially through 11 input wells. The program takes in Pan Am's M. R. Barry, W. A. Coons, W. G. Frazier, Minnie Slaughter Veal, Mid-Seale, Alex A. Slaughter Estate "A," and "B" leases in Hockley County. The leases now have 126 producing wells.

Gas for injection will be dry gas from the Slaughter gasoline plant. Pressure of the 5,000-ft. San Andres pay zone in the area has declined to an average 639 psi. from the original 1,710 psi.

Pan Am asked for a net gas-oil ratio under which oil-allowable credit would be granted for gas injected. It also seeks authority to transfer unpenalized allowables of input wells and the establishment of a gas-bank account.

Sulfur Line Arouses Interest

. . . of oil pipeliners. Tricky problems faced in laying three-in-one pipes into the Gulf to mine mineral beds.

ONE of the strangest pipelaying jobs in the history of the pipeline industry is now in progress off Grand Isle, La.

Freeport Sulphur Co. is installing its 7-mile molten-sulfur pipeline that consists of three concentric pipes and two others which ride piggyback (OGJ, March 16, p. 82). Still another pipe is strapped to the bundle for buoyancy during the laying operation.

Sharman, Allen, Gay & Taylor, Inc., Houston contractor, has the job of putting the bulky load into the water.

The contractor is pulling 16 sections of 2,000-ft. lengths into the water by barge. A seventeenth section will remain on land.

The 2,000-ft. sections were made up at the launching site and placed on racks which flank the launching ramp. To reduce friction during launching, the contractor installed V-type rubber-covered roller assemblies every 40 ft. along the ramp. Five side-boom tractors help to pick up the weight.

The entire bundle of six pipes weighs 200 lb. per ft. or 400,000 lb. for each 2,000-ft. section.

The pull barge, a 74-ft. by 240-ft. tideland barge is equipped with two three-draw winches powered with diesel engines. Eight lines extend from the barge to the pipe.

After the pipe is laid in the trench, divers will open the valves of the 16-in. light-wall buoy pipe and allow them to fill with water. Then the buoy pipe will be cut loose from the bundle, the water pumped out, and the pipe salvaged.

Greatest water depth in the 7-mile distance to the offshore mining operation is 45 ft.

New problems . . . The oil industry has been watching the Freeport Sulphur operation closely, even though no oil will ever flow through the five permanent lines being laid.

Difficult engineering problems faced the designers because of the difficulties in piping molten sulfur.

The three concentric pipes consist of 14-in. protective casing, a 7⅝-in. hot-water jacket, and a 6-in. line to carry 320° F. molten sulfur.

One piggyback line of 4½-in. diameter will return hot water to the mine, and the other, of 6⅝-in., will supply fresh water.

Just how the line operates under working conditions won't be known before the first quarter of 1960. Freeport Sulphur is now drilling its sulfur wells from a platform in block 18, Grand Isle area, and also is constructing an onshore heating plant with a capacity of 5 million gallons of sea water daily.

Lone Star Wins

. . . Knox field gas if FPC examiner's decision stands.

LONE STAR Gas Co. has won a favorable decision from a Federal Power Commission examiner on its bid for large gas reserves in southern Oklahoma.

The company plans to lay about 7 miles of 10-in. pipeline to connect its system to Knox field, which has reserves estimated at up to 500 billion cubic feet or more.

Oklahoma Natural Gas Co. is to receive one-half of the gas for intrastate use. The entire supply will go into intrastate commerce, which is not subject to FPC jurisdiction, unless Lone Star gets the necessary authorization by November 1 to take its share of the gas.

Sales approved . . . The examiner's decision also would authorize 10 independent producers to sell Knox field gas to Lone Star.

The producers are Phillips Petroleum Co.; Pan American Petroleum Corp.; Anderson-Prichard Oil Corp.; British-American Oil Producing Co.; Mack Oil Co.; Ohio Oil Co.; Gulf Oil Corp.; Norville Oil Co., Inc.; Republic Natural Gas Co.; and Eason Oil Co.

Decision of the examiner becomes final in 30 days unless a review by the commission is initiated within that period.

Discussing the effect of the Supreme Court's decision in the CATC case, the examiner said there was "crystal clear" evidence that the gas supply has been dedicated to an intrastate market unless certificates for interstate sales are issued within the stipulated time.

He also approved the initial price of 16.8 cents per M.c.f., pointing out that Oklahoma Natural had contracted for half the gas supply at that price.

In the CATC ruling, the Supreme Court questioned the demand for large gas reserves in intrastate commerce. The majority ruling also urged careful scrutiny by the FPC of initial rates in new gas contracts.

Flood Is Planned

. . . in Grayson County field with Magnolia as operator.

OPERATORS in Sadler Pennsylvanian field in Grayson County, North Texas, plan a unit and waterflood program which they expect will hike oil recovery from the pool by 7,000,000 to 11,000,000 bbl. over primary.

Magnolia Petroleum Co., projected unit operator, told the Texas Railroad Commission last week that 97% of working interests and 98.5% of royalty interests have signed the unit agreement.

The unit would take in 3,174 of the 3,650 acres estimated to be productive in the reservoir. There are about 130 wells in the area—18 of them shut in with zero allowable awaiting secondary-recovery operations, and 48 more on marginal status.

Magnolia said initially operators plan to convert eight of the producers to input service and inject about 8,000 bbl. of water daily through them into the Sadler Pennsylvanian sand topped at 6,900 ft. Field-wide flood pattern will be fixed following analysis of performance of this initial injection plan.

The field is about 4 miles long and 2 miles wide.

PIPELINE

The FPC has approved Panhandle Eastern Pipe Line Co.'s plan for allocating 157,000,000 cu. ft. of natural gas per day among its present customers in the Midwest. The volume includes 127,000,000 cu. ft. daily to become available when Panhandle abandons sales to Michigan Consolidated Gas Co., Detroit. Discontinuance of service to Michigan Consolidated, previously set for March 15, will become effective in mid-August under the new commission order.

Authority to build a $5,000,000 natural-gas transmission line from Aiken to Pontiac, South Carolina has been given the Carolina Pipeline Co. by the South Carolina Public Service Commission. It will make natural gas available to consumers in Winnsboro, Conway, Myrtle Beach, and Georgetown. The pipeline now serves 20

Phillips Starts Changing Its Color Scheme

- Sales people get peek at the new look as outlets in Bartlesville are redone.

A BRIGHT new look is in prospect for Phillips Petroleum Co. marketing outlets.

The start of a face-lifting job, in which a complete new color scheme greets Phillips customers, has been made in 20 retail stations in the Bartlesville, Okla., area.

The Phillips shield trademark is being redone. The word "Phillips" in the top bracket is in straight black lines on a white background. The numerals "66" are in white at the bottom on a reddish background. At present, the name is in black or red and the numerals are black on red.

Station exteriors are being painted an off-white or eggshell color with red trim. Roofs are a light gray. Premium fuel pumps are in dark gray and white and the regular grade pumps are red and white. Stations are trimmed in red.

For the last 16 years, Phillips stations have worn three shades of brown and a bright reddish orange on the outside with green interior walls. Oil can racks and other apron shelving now are being redone in yellow. Grease and wash room interior walls are in yellow and white.

Phillips has about 21,000 retail outlets in 40 states. The Bartlesville stations were on parade last week as sales managers met to hear of the program and view the first examples of the changeover.

TULSA office sign looks different. Old-style shield is at left.

Redecoration of all Phillips outlets would take 3 to 4 months. Station attendants now wear uniforms which carry the Phillips trademark and are in colors matching the stations.

BRIEFS . . .

communities in 12 South Carolina counties.

A 155-mile welded-steel pipeline to transport gasoline, jet fuel, and other petroleum products from the Continental Oil Co. refinery at Artesia, N. M., to El Paso, Tex., will be built by the Southern Pipe Division of U. S. Industries, Inc., Azusa, Calif. Deliveries of pipe to El Paso and Artesia have started. Contract for 5,000 tons of pipe was made by Continental Pipeline Co., a Continental Oil subsidiary.

A 103-mile 30-in. looping program will be completed in October by Northern Natural. Looping has been contracted by R. H. Fulton & Co., Lubbock, Tex. A major expansion of compressor stations also is under way. Projects and contractors are 2,000 hp. at Clifton, Kans., and Palmyra, Neb., and 4,000 hp. at Beatrice, Neb., H. B. Zachry Co.; 2,000 hp. at Mullinville and Bushton, Kans., Dresser Engineering Co.; and 2,000 hp. at Ogden, Iowa, Foor Corp. Dresser has already installed 2,000-hp. units at Sunray, Tex., and Beaver, Okla.

United Fuel Gas has completed 79 miles of pipeline during the first half of the year and plans to lay 180 miles the remainder of the year. Projects for the last half include 99 miles of trunk line and 81 miles of gathering line.

A $1,600,000 28-mile crude line connecting Fourbear, Pitchfork, and Spring Creek fields in Wyoming is planned by Honolulu Oil, Skelly Oil, Sinclair Oil & Gas, Hunt Oil, Mule Creek Oil, Texaco, Inc., and Husky Oil companies. Honolulu has filed application for approval with the Wyoming Public Service Commission.

Also for Pipeliners . . .

IN THE NEWS: New hot sulfur line in gulf attracts interest of industry (p. 108) . . . Lone Star wins Knox field gas if FPC examiner's decision stands (p. 108) . . . Rothschild group backs 16-in. pipeline project in Israel linking Aqaba Gulf to Mediterranean (p. 117).

A complete list of pipeline projects is carried in this issue beginning on page 191.

PLUS THESE TECHNICAL REPORTS: Pipeline construction will surpass total for 1958 (p. 140) . . . What the Zwerdling decision means to independent gas producers (p. 156).

What the Future Holds for Geologists

For the first time since the Great Depression geologists are being laid off in the oil industry.

These men, furthermore, are finding it difficult to land another job—and this in a period of prosperity.

To explain the causes behind this situation, the outlook, and what it means to the geological profession, The Oil and Gas Journal called on Dr. A. I. Levorsen.

Levorsen is a man of many accomplishments. He has been the chief geologist of two oil companies, a world-renowned consultant, and professor and dean of the School of Mineral Sciences at Stanford University. He has written a very popular geology textbook, edited two AAPG symposiums, and served the society as a distinguished lecturer.

Levorsen, despite his high accomplishments, has retained his enthusiasm for things geological and has been an inspiration to, and counselor for, many younger men in the profession.

Following are Levorsen's answers to the Journal's questions.

Q. Mr. Levorsen, is there really a shortage of geological work?

A. Yes, there is a shortage in petroleum exploration. Many petroleum geologists are out of work, some with many years of experience.

Q. What is the cause? Is the unemployment a reflection of recent economic difficulties in the oil industry?

A. I believe the cause basically is due to a worldwide excess of supply over demand.

Reason for the oversupply is that the oil industry recently has been exploring many virgin areas that have been opened up politically with 1950 technology. Better drilling, engineering, geophysics, and geology—coupled with changing economic conditions—have permitted an oversupply of oil to be discovered and quickly developed. This oil now attempts to find a market.

As the oversupply becomes apparent, exploration companies cut appropriations, withdraw from marginal areas, and reorganize their efforts to fit the changing conditions. The first to go are the geologists and geophysicists.

Q. Is this trend likely to continue?

A. The situation could continue for some years to come. The oversupply now is physical, but there is one thing to keep in mind. It could change politically overnight to an undersupply as political forces ebb and flow in the Middle East, Venezuela, and the Far East.

Q. What is the prospect for new opportunity for geologists in the next few years?

A. There is no question in my mind but that opportunities for younger geologists will be less in petroleum exploration during the next few years as compared with recent years.

And as the lack of jobs permeates the colleges, there will be fewer who major in geology and geophysics. Only 5 years ago there were five companies talking to each graduate in geology. Now there are five graduates for each oil company and three times that many for each job. And everyone knows that any job will command the man with the best training.

Q. What trends are taking place to change geological training? What are the colleges doing?

A. The strong schools are getting stronger in that requirements for graduation are becoming more rigid and more students are encouraged to take advanced graduate training.

This advanced training consists more and more of additional training in the precise thinking that comes from studies in physics, chemistry, and mathematics. This tends to give a broader base to a person's education and he can work in several fields.

M.I.T., for example, as a result of the magnificent gift of Mr. and Mrs. Cecil Green of Dallas, is planning courses of study that will graduate a scientist—not a specialist in the narrow sense.

Q. Is the geological profession undergoing any major or fundamental shift in direction?

A. No, I don't believe so. Geology still will be done in the same way but with gradual changes in the emphasis. Rather, I believe we are in a periodic slowdown of work in petroleum exploration.

Many of us who were caught in the 1930 depression period can well remember what it means to lose a job with nothing in sight. The effect is to force one either to do better and more geology or to quit the profession. Another effect is to improve the teaching in the geology schools, and with that, there are fewer to teach.

Actually, most of those who lost their jobs during the depression but who stayed on with geology as best they could came out better in the end than those who held their jobs and were shielded from the experience of having to make it on their own.

Q. Do you believe geology can become more useful and find more work outside the oil industry?

A. Yes, geology can broaden its usefulness greatly both inside and outside the oil industry.

Basically geology is a way of thinking—of working with many variables. It makes excellent training for management and administrative jobs, for working on complicated problems, for work on research teams, for techni-

. . . an interview with Dr. A. I. Levorsen

cal selling of equipment, services, etc., and for thinking through evidence to reach a conclusion.

Q. What broader activity do you have in mind within the industry?

A. Well, one is to rework the older areas—areas where a company still retains acreage and has production.

Most of the new techniques and concepts have been applied to the new areas and have passed over the older regions. Precise logging, rework samples, hydrodynamic surveys, new production techniques, and secondary recovery are a few.

Q. What other advantages do these older areas offer?

A. They have the local markets, depths are shallow, leases cheap, information available and abundant. Many geologists could be turned loose in these areas and undoubtedly would come up with prospects worth far more than the cost of the studies.

The recent article by D. A. Busch of Tulsa on searching for stratigraphic traps in the older areas of Oklahoma is to the point—this kind of work would support a great many petroleum geologists in many areas in the United States—Oklahoma, Texas, Kansas, Ohio, Pennsylvania, Illinois, Indiana, Kentucky, etc.

Q. Any other areas?

A. Yes, another activity within the industry is to rework the undeveloped regions of the United States—the areas of low bonus, the $1 to $5 country, or even where a block of leases can be had for drilling a wildcat well.

Most of the provinces were once such as this and there are many potential but undrilled regions yet to be explored where drilling is on the order of a few thousands, or even a few hundreds of feet.

Q. Any activity possible outside the oil industry?

A. Yes, the state geological surveys should publish and expand their studies on surface geologic maps and their other work, such as reports of well records, sample descriptions, detailed surface stratigraphic sections, compilation and evaluation of reservoir fluid pressure measurements, and oil pool analyses.

These are the permanent, basic data upon which wildcat wells are drilled and discoveries frequently made. Published reports such as these can be studied anywhere —by geologists out of work, for example. Just such studies many times in the past have paid off to the state a thousand to one.

Q. What do you advise for the individual geologist?

A. He can work up his own prospect. If it looks good and reasonable, he can get it drilled. The geological literature, trade journals, and log libraries furnish the basic information. But it must be mined to get the good out of it.

INDUSTRY BRIEFS . . .

Pioneer Natural Gas will supply 15,000 M.c.f. of gas per day for repressuring operations in Headlee-Devonian field of Midland and Ector counties, West Texas. Deliveries will begin October 1. Texas Gulf Producing is operator for 15 companies in the project. Pioneer will build a 12-in. line to connect its system to the field. Contract calls for Pioneer's retention of preferential right to repurchase an equivalent amount of gas when repressuring ceases.

Merger of Halliburton Oil Well Cementing Co. of Duncan and Otis Engineering Co. of Dallas was completed last week, when directors of both companies approved a stock transfer agreement. The Otis organization makes oil tools and equipment and operates in five southwestern states, Canada and Venezuela. It will operate as a Halliburton subsidiary. (OGJ, June 5, p. 79).

Texas Eastern Transmission is seeking FPC authorization to build a 7,500-hp. natural-gas compressor station at Longview, Tex. Cost of the station, which would have three 2,-500-hp. gas reciprocating compressor units, would be $2,500,000. It would be at the origin of the firm's big-inch natural-gas pipeline which terminated near New York.

Tidewater's 10,000 retail outlets in the U. S. will honor Hilton "Carte Blanche" credit cards, effective immediately, it was announced last week. Previously, contracts for acceptance of the cards were signed by Shamrock Oil & Gas, Union Oil Co., and Mobil Oil. (OGJ, June 29, p. 57, and Feb. 16, p. 81).

An-Son Offshore Drilling Co. has purchased the J. P. Stephens barge rig from Phillips Petroleum. An-Son will move the rig to Block 18, Eugene Island area in the Gulf of Mexico to drill for Shell Oil. The elevated-deck barge rig is capable of drilling in protected waters up to 18 ft. deep.

New Opal, Wyo., natural-gas processing plant of El Paso Natural Gas is on stream. The plant can handle 250,000 M.c.f. daily from Big Piney field. Liquids are extracted and residue gas is delivered to Pacific Northwest Pipeline. Wyoming Gov. Joe Hickey was featured speaker at dedication ceremonies last week.

Alberta's recent sale of exploration rights on 99,840 acres east of Pelican Portage on the Athabasca river has brought in $62,899 from Richfield Oil, Canada Cities Service, and Devcan Petroleums, Ltd. The area is 150 miles northeast of Edmonton. No bids were received on six other reservations offered at the sale.

New Tanker Terminal Opened

. . . in Los Angeles Harbor. Its facilities can accommodate world's largest ships quickly at a protected wharf.

THE WORLD'S first protected supertanker terminal is now open for business in Los Angeles Harbor.

The $4-million facility was dedicated and turned over to Union Oil Co. of California which will operate it under a 30-year preferential assignment. Any company, however, may use the terminal.

First customer at the wharf was the S.S. Torrey Canyon, above, which was opened for a reception following dedication ceremonies on the wharf. The tanker, with a maximum capacity of 478,000 bbl., is not the largest expected to call at the port.

Harbor Manager Bernard J. Caughlin said that completion of the terminal makes Los Angeles the first port in the world to catch up with the recent tremendous increase in size of tankers. Previously these big ships have had to take the pounding of the open sea while discharging their vast cargoes of Persian Gulf crude through pontooned pipelines.

The new terminal stands on an 18-acre man-made peninsula formed with earth dredged up from the outer harbor's bottom during creation of a fairway. The fairway is 500 ft. wide and 46 ft. deep and extends from the breakwater entrance to the terminal site.

The reinforced concrete wharf is 960 ft. long and 60 ft. wide with outboard dolphins at either end allowing a tie-up length of 1,160 ft.

Five hydraulically operated loading arms are located on the wharf. They swing out to attach to the ship at the push of a button and unload 35,000 bbl. of crude an hour. One man controls the massive flow of oil from an office on the wharf. He also can obtain instantaneous temperature and level readings from five storage tanks a short distance away.

Also servicing the wharf are a tank farm of 875,000-bbl. capacity and four pipelines serving the tank farm and refinery.

The lines include a 30-in. line to move crude from ship to tank farm, two 12-in. fuel lines from farm to ship and one 12-in. reversible fuel or crude line from tank farm to refinery.

Florida Site Picked

. . . by Frontier Refining for long-planned refinery.

A LONG-PROPOSED Florida refinery by Frontier Refining Co. finally has a site.

Construction of the refinery, first proposed more than 7 years ago, will not begin immediately. Plans are not far enough along for a decision on capacity.

Frontier announced that its Florida Oil & Refining Co. has contracted for a deep-water site on the east coast of Florida—near Port Canaveral.

Among previously proposed Florida sites for the refinery were Fort Pierce, West Palm Beach and Jacksonville. Frontier recently acquired all of the outstanding stock of Miami Oil and obtained the option on a site near Port Canaveral.

Looking for crude . . . M. F. (Bud) Robineau, Frontier president, went to Europe recently to line up crude supplies.

He was accompanied by Mark Millard, a Frontier director and a partner in the New York investment banking firm of Carl M. Loeb, Rhoades & Co.

"An East Coast refinery cannot operate profitably under present market conditions on domestic crude oil, un-

PROCESSING

American Chemical Corp. will start construction within 60 days of a vinyl chloride polymer unit at its plant near Wilmington, Calif. Completion is scheduled in mid-1960. Three other units for making ethyl chloride, ethylene dichloride, and vinyl chloride monomer are being built by C. F. Braun & Co. The new unit will be constructed by Scientific Design Co., New York.

A skid-mounted methane purification plant to be installed at the Stauffer Chemical Co., LeMoyne, Ala., will be built by Refining Engineering Co., Tulsa, a division of Vitro Corp. of America. It will separate propane and heavier hydrocarbons from a pipeline gas stream. The plant will be built in Tulsa and shipped to LeMoyne.

Sinclair Refining Co. has acquired 49 retail outlets in the Fairmont-Clarksburg section of West Virginia formerly served by Cities Service Oil Co. L. J. Hoar, Sinclair marketing

less it also can import a percentage of foreign crude oil comparable with the percentages presently allocated to large major East Coast refiners," Frontier said.

"Announcement of construction plans is being delayed until final arrangements have been completed on crude supply."

In a message to stockholders, Robineau said Frontier is continuing its efforts to obtain an import license and to complete this project.

Struck Units Operating

SUPERVISORY PERSONNEL at the American Oil Co. refinery at Texas City have put three units into operation despite a strike of 1,300 employes.

Plant Superintendent B. F. Babin said a thermal cracking unit, a catalytic cracking unit, and an ultraformer are in normal operation. Also treating plants, pump houses, and other needed facilities are operating.

The thermal unit is processing 35,000 bbl. daily, the cat cracker 27,000, and the ultraformer 14,500. The plant's throughput prior to the strike was 130,000 bbl. daily.

The strike was called July 1 by the Oil, Chemical, and Atomic Workers Union over the contract issue of work assignment and job classification. Picketing was peaceful as the dispute passed the 3-week mark.

Dowell Unveils Acid Guide

A NEW WAY to take the guesswork out of acidizing an oil well has been developed by engineers and researchers for Dowell Division of Dow Chemical Co.

The new technique is called "Acid Guide," very similar to the company's recently released "Frac Guide."

Dowell engineers say the "Acid Guide" for the first time makes it possible to predict:

... Advisability of an acid treatment for a specific well on the basis of sound engineering principles rather than trial and error.

... Probable production increase from a given acid treatment.

The guide can determine the best type of acid to use, its proper concentration, and the right amount to get best results in a given oil-producing formation. What the guide does is provide a means of balancing the right kind and volume of acid against the correct injection rate.

The "Acid Guide" is based on a series of curves derived from a detailed study of thousands of acid treatments made on many kinds of wells and in many reservoirs.

The starting point in planning an individual acid treatment is the determination of an "acid index number." This "index number" varies from well to well, and is obtained from laboratory analyses of well samples and other reservoir data, including bottom pressure and temperature.

Other factors to be evaluated in planning an acid treatment are type of drilling fluid used in drilling the pay, degree of bore-hole damage, and type of reservoir fluid.

Formation breakdown pressure, depth to pay, number and thickness of producing zones and completion method also must be considered.

Dowell said the guide resulted from detailed well and laboratory data and experience in the field where the technique was finally proved.

Alaska Lease Bill Gets Nod

THE SENATE interior committee last week approved a bill to increase the individual limit on federal oil leases and options in Alaska to 600,000 acres.

As originally presented, the bill called for a 1,000,000-acre limit. The Senate version conforms with that approved by the House interior committee earlier this month.

Under present law, an individual or company is permitted to hold federal leases on up to 100,000 acres and options on an additional 200,000 acres in Alaska.

BRIEFS . . .

director, said present dealers and personnel will continue to operate the stations.

Construction has started on a $2,000,000 unit to produce propylene at Sun Oil Co.'s Marcus Hook, Pa. refinery. It will produce 120 million pounds of propylene annually and will go on stream late this year. Major equipment will include two 145-ft. towers. One propylene customer will be Avi-Sun Corp. of New Castle, Del., which will convert it to polypropylene for film making.

A multipurpose chemical unit is being added to Phillips Chemical Co.'s Philtex plant near Borger, Tex. Completion is scheduled late this year. Phillips will use the unit to further upgrade a number of hydrocarbon feed stocks at its Philtex plant.

Iowa Farm Supply Co. of Des Moines is buying the Midland Cooperatives, Inc., interest in the National Cooperative Refinery Association, which operates a 30,000-bbl. refinery at McPherson, Kans. The Iowa company will acquire 50% of Midland's interest this year and 50% next year. Midland headquarters in Minneapolis.

A new outboard motor oil has been developed by Phillips research and development department. Phillips says the oil reduces spark-plug fouling, minimizes ring sticking and piston varnish, and changes the characteristics of combustion-chamber deposits to dry flaky material that is purged through the exhaust.

Kenneth M. Brown, Universal Oil Products technical service engineer, will head an American Society for Testing Materials subcommittee to establish international specifications for aromatic hydrocarbons. The subcommittee will work through American Standards Association with the International Standards Organization to set up purity specifications and testing methods.

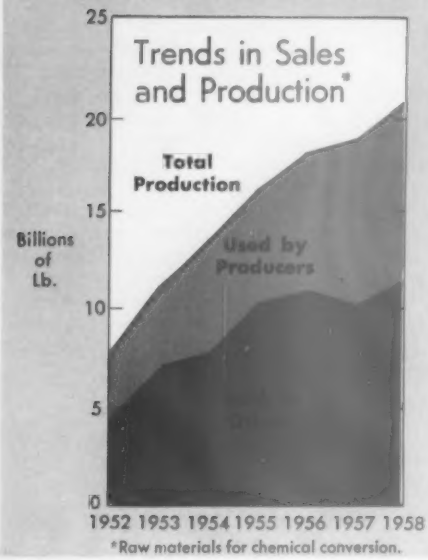
A new 8,000-ton butadiene terminal will be built on the Houston ship channel by Texas Butadiene & Chemical Corp. and Hess Terminal Corp.

Also for Refiners...

IN THE NEWS: Atlantic Refining cuts East Texas crude price 20 cents a barrel (p. 97) . . . Congress still reluctant to increase gasoline tax (p. 98) . . . Tubing that may be flattened into a ribbon and inflated at the point of use may find use in refining (p. 104) . . . Anchor Gasoline is having smooth sailing with all-electric controlled Tabasco gasoline plant (p. 105) . . . Los Angeles opens protected wharf for supertankers (p. 112) . . . Petrochemicals make good gains in production and sales in 1958 but only slight increase in revenue (p. 114) . . . Tidewater may build new refinery in Denmark (p. 118).

PLUS THESE TECHNICAL REPORTS: Dehydrating gas with calcium chloride (p. 166) . . . Digital computer makes refining largely predictable for Tidewater (p. 177).

A Look at the U. S. Petrochemical Industry



Production by Products

(Thousands of Pounds)

Aromatics and naphthenes	1958	1957	1956
Distillates and solvents	1,271,785	671,196	725,496
Benzene	1,041,659	851,628	818,123
Cresylic acid	38,078	35,191	29,772
Naphthenic acids	18,961	16,774	22,937
Toluene	1,501,337	1,121,585	946,789
Xylenes	1,380,773	829,843	894,580
All others	32,341	43,278	21,478
Totals	5,284,934	3,569,495	3,459,175
Aliphatic hydrocarbons			
C_2 hydrocarbons	4,795,322	4,586,161	4,164,511
C_3 hydrocarbons	5,035,744	4,249,571	3,823,861
C_4 hydrocarbons	4,294,619	4,573,550	5,039,028
C_5 hydrocarbons	171,524	141,518	310,709
All others	1,321,356	973,598	1,100,746
Totals	15,618,565	14,524,398	14,438,855
Grand Totals	**20,903,499**	**18,093,893**	**17,898,030**

Petrochem Comeback Staged in 1958

- **Spectacular gains in production and sales far outshine revenues due to soft prices. Industry outlook still good.**

THE OIL industry enjoyed a record year in petrochemical production and sales in 1958.

Unfortunately, the resurgence came during a period of soft prices. While gains of 15 and 16% were being recorded in output and sales, dollar income rose only about 1%.

Nevertheless, a resumption of the upward climb, following a lull in 1957, has brightened the industry's outlook, and the pace is expected to be maintained this year.

While the maturing petrochemical industry can no longer expect the tremendous percentage gains of the past decade, when annual increase in demand averaged 11%, it has a healthy future ahead. Predictions call for petrochemical consumption to increase at a rate of about 6-7% annually, double that of all industry.

Oil industry petrochemical production figures for 1958, as released in a preliminary report prepared by the U. S. Tariff Commission, bear this out. These figures include consumption by the companies themselves, and hence act as a more accurate barometer than sales alone. Production in 1958 reached 20,903 million pounds. This is a 15% gain over 1957 output of 18,094 lb.

Sales of raw products from petroleum and natural gas for chemical conversion totaled 11,904 million pounds last year. This compares with 10,330 million pounds in 1957 and 11,032 million pounds in the previous record year of 1956. While sales rose 16% in volume, the income gain was only about 1%. Sales income rose to $380 million from $376 million.

Aromatics shine . . . The oil industry made particularly good showings in production and sales of aromatic and naphthenic products.

Total production in this category last year totaled 5,285 million pounds, up 48% from the 1957 output.

Sales amounted to 3,412 million pounds, worth $98 million, compared to 2,429 million pounds the year before for a dollar income of $87 million.

Biggest gains were made on its competitors—coke-oven operators and tar distillers—in the aromatics field. In the biggest competitive area, petroleum operators increased sales of benzene from 80 million gallons to 108 million gallons, while coke-oven operators dropped from 172 million to 119 million gallons. The salesmen can't rest on their laurels, however, for coke-oven output dropped due to the slowdown in steel production. An extended steel strike, of course, could mean another banner year for aromatics sales from petroleum.

Benzene production from petroleum reached 1,042 million pounds, a gain of 22%. Toluene output rose to 1,501 million pounds for a 33% gain, while output of xylene jumped to 1,381 million pounds for a 66% increase.

Income dips . . . Production of aliphatics increased 7½%, up to 15,619 million pounds from 14,524 million.

Sales, however, told another story. They totaled 8,942 million pounds, worth $282 million. The income was $7 million less than the amount received for 7,901 million pounds of aliphatics sold the previous year.

Ethylene continued its unbroken rise to a new production mark of 4,149 million pounds, up from 3,947 million in 1957.

Propane output increased to 3,019 million pounds from 2,463 million and propylene increased to 1,769 million pounds from 1,512 million. Butadiene production, meanwhile, slipped to 1,443 million pounds compared with 1,542 million the year before.

Fur Flies in Tiny Tract Furor

. . . as court upholds TRC in two less-than-acre drill site cases. Halbouty questions ruling and may appeal.

THE CLAMOR over the Texas practice of permitting the drilling and profitable production of gas wells on tiny tracts keeps getting louder.

The racket increased noticeably last week following decisions by the Third Court of Civil Appeals in Austin backing Texas Railroad Commission actions and lower court rulings in two more so-called Rule 37 cases.

In one, the appeals court rejected an appeal by Michel T. Halbouty and other operators for cancellation of a permit granted by the commission to W. G. Darsey, Jr., to drill a $300,000 gas well on a .48-acre tract in prolific Port Acres field in Jefferson County on the Texas Gulf Coast.

The court held that Texas law requires the commission to grant such permits in order to protect the right of the surface owner to recover the oil and gas under his land.

On the same reasoning, the court also refused to overturn a Rule 37 permit issued by the commission to Curtis Hickey to drill a gas well in Bethany field on a .625-acre tract. The appeal was taken by W. H. Foster from an adverse decision by the Ninety-Eighth District Court. Circumstances in both small-tract cases were virtually the same.

Now to higher court? . . . Halbouty argued in the first case that granting of the permit will create a ridiculous and hazardous situation in that it would open the way to drilling of wells on each of 500 residential lots in the field.

The court rejected this argument, saying that hazard was a matter to be handled by Railroad Commission rules and that it could not be used to deny property rights to Darsey.

The court also rejected Halbouty's argument that an unconditional offer to unitize the area had been made to Darsey and was refused. It noted that Texas law gives the commission no authority to require unitization—that it's a wholly voluntary matter.

Neither, it said, does the fact that a proposed field rule amendment is pending before the commission interfere with Darsey's right to have a Rule 37 drilling permit on his small tract.

Halbouty was joined in his attack on the order by Pan American Petroleum Corp. as an intervenor. It is felt likely that the case at least will be taken to the Texas Supreme Court.

Draws Halbouty ire . . . The commission action and subsequent court action brought an outraged blast from Halbouty last week in the form of a public statement:

"This indiscriminate granting of well drilling permits as exceptions to the applicable spacing rule is for the alleged purpose of preventing confiscation of property of the owner of tiny tracts. It results, however, in owners of tracts as small as .3 acre being permitted to produce one third of the amount of gas permissibly produced by a well located on a full-size 160-acre spacing unit.

"Three wells on three such small tracts containing a total of 1 acre are permitted to produce from the reservoir as much as one well located on a full size 160-acre unit (under the commission's conventional one-third well, two-thirds acreage allocation formula for such fields). These three wells would, therefore, be entitled to produce 160 times as much gas as was originally in place under their leases.

"Can anyone contend that such an allocation formula . . . is in accordance with the conservation statutes of this state which command the Railroad Commission of Texas to protect correlative rights, conserve gas, and allocate gas production from a reservoir each month so that each well is permitted to recover its fair share of the gas?

"Why should a man with a half-acre of land be given far more than his share of hydrocarbons below that land? What kind of American justice is that? Our opponent said we were trying to get to the little man. What we were trying to do was to deny him the legal right to something that by moral law, at least, belongs to some other landowner."

Halbouty said he holds the Texas Railroad Commission in high regard. But he contends that the Texas conservation agency "is mistaken if it believes that it is bound by laws or court decisions to grant disproportionate allowables to wells drilled on small tracts."

Compact Still Under Eagle Eye

. . . of reluctant Justice Department, as Congress cracks whip. Annual reports give pact a clean bill of health.

THE DEPARTMENT of Justice will continue to make annual investigations of the Interstate Oil Compact's conservation practices.

A 4-year extension of the Compact, approved last week by the Senate interior committee, provides for continued supervision by the Attorney General. The provision was written in before the House approved the extension June 15.

Now assured of quick passage by the Senate, the resolution authorizes continuation of the Compact until September 1, 1963.

The agreement, known officially as "an interstate compact to conserve oil and gas," was first adopted in 1935. It has been renewed and extended, with the consent of Congress, half a dozen times.

The Attorney General sought to be relieved of his annual chore of reporting on the activities of member states. But the plea was turned down.

Bouquets for pact . . . So far, the Attorney General has made three annual reports since being assigned the investigative role in 1955, when extension of the Compact was last approved by Congress. Specifically, he is required to report to Congress as to whether activities of the Compact states have been consistent with the Compact's purpose of conserving oil and gas.

In his annual report, the Attorney General has consistently endorsed the Compact as a voluntary agreement for preventing oil and gas waste. He has made no accusation of illegal use of the Compact to fix prices, encourage monopoly, or promote regimentation in the industry, all of which are excluded from the purpose of the compact.

However, the annual reports to Congress have sometimes wandered far afield from the scope of the Compact itself.

The latest, released last November, raised the question of possible divorcement of oil pipelines from major companies. This possibility was left up in the air with the statement that any recommendation in that respect "must await full and careful investigation."

Amoseas Makes Good Strike in Libya

• Beda wildcat has a flow of 1,282 bbl. daily on big block southwest of Bengasi.

ANOTHER company has found oil in the intense exploration play in northern Libya.

American Overseas Petroleum, Ltd., brought in Beda 1 on Concession 47 with a flow of 1,282 bbl. daily of 36°-gravity crude from about 4,000 ft. The wildcat is near the southern boundary of the 1,024,000-acre block and 264 miles southwest of Bengasi.

The discovery well produced from a limestone formation, the thickness of which was not reported. Amoseas last week was drilling ahead in the well at 4,135 ft. The company is the exploration arm of the Caltex group, whose companies are owned jointly by Standard Oil Co. of California and Texaco.

The find lies between and south of two other important discovery areas. Esso Standard's 17,500-bbl. daily Zelten 1 lies about 85 miles northeast. Three producing wells completed by Oasis Oil Co. on Concession 32 lie about 110 miles northwest. The new discovery lies about 125 miles from tidewater.

New Texas Gulf zone . . . The Mabruk 1 discovery of Texas Gulf Producing Co., meanwhile, has yielded oil from two more zones.

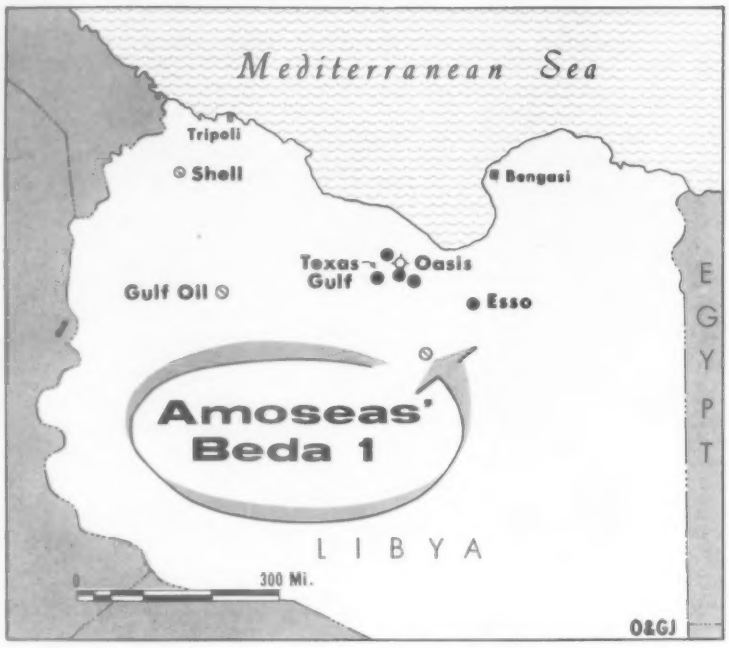
The wildcat is in the northeast corner of Concession 17 which lies west of Block 32.

A 1-hour drill-stem test on a 30-ft. zone from 5,711-41 ft. recovered 29 bbl. of oil. Farther down hole, 45 bbl. was recovered on a 2-hour test of a 4-ft. zone from 5,774-78 ft.

Libyan American Oil Co., the operating subsidiary, is drilling ahead to the primary objective, a depth of 6,500 to 7,000 ft.

The company initially found about 90 ft. of limestone pay at about 3,000 ft. A 1-hour drill-stem test on the upper 30-ft. section yielded 28 bbl. of crude. Tests also were made on the lower 30-ft. intervals.

Good batting average . . . Most of the wildcats drilled in Libya so far have had some shows.



Six of the nine operators who have been drilling for any length of time have possible commercial discoveries in hand. Besides Amoseas, Texas Gulf, Esso, and Oasis, which is operator for the Conorada group, finds have been made in western Libya by Gulf Oil and Royal Dutch-Shell.

The more active operators still waiting for their first success are Socony Mobil, British Petroleum, and a French company, Cpt. (L). Talara B1, drilled by CPT (L) in western Libya on Concession 49, produced about 100 bbl. daily from 4,600 ft., but the well has been temporarily abandoned. Esso's Atshan 2 in Fezzan came in at 500 bbl. daily and was considered noncommercial.

A total of 13 companies, including the Conorada group, have concessions in Libya. But one company, Pan American International, is just getting its first wildcat under way, and three other firms have not yet started drilling.

In the discovery areas, Esso is down to 4,708 ft. in Zelten 2 on Concession 6, where it is having lost-circulation trouble. Oasis has two wells drilling in Block 32. Gulf is fishing for drill pipe at 5,630 ft. in its Emgayet discovery on Concession 66. Shell is drilling ahead at 12,148 ft. at its Bir Tlacsin find on Concession 70.

Several other wildcats are in progress. Esso, Shell, and Amoseas have wildcats drilling in Fezzan. Mobil Oil is setting casing to the total depth of 10,146 ft. in a test on Concession 12, which lies to the east of Esso's Zelten discovery. Pan American is drilling the most southerly well in the country, and CPT (L) is testing a wildcat in Tripolitania.

Neutral Zone Test Starts

THE NEUTRAL Zone's first offshore wildcat was spudded last week by Arabian Oil Co.

The Japanese-owned company is drilling in 102 ft. of water 25 miles offshore. Objective is the Arab zone, and the projected depth is 8,000 ft. Drilling is being done by the "C. E. Thornton," a Le Tourneau three-legged platform.

It is located at 48° 59′ E. and 28° 30′ N. Nearest production is the northernmost producer in Safniya offshore field.

The Japanese already have staked location for their second and third wells.

Pipe Dream Comes True

- Rothschild group backs project to give Israelis 16-in. pipeline from Aqaba Gulf to Mediterranean.

A NEW pipeline concession contract has paved the way for completing the Israeli dream of a major crude-carrying system from the Gulf of Aqaba to the Mediterranean Sea.

The agreement covers a project for a 125-mile 16-in. line to replace an existing 8-in. line running from Elat to Beersheba. On hand for the signing were David Ben-Gurion, Israel's prime minister, and Baron Edmond de Rothschild, French financier who is heading a group investing $20 million in the project. Approval of the program by the country's parliament, Knesset, has been assured.

The rest of the 250-mile system already has 16-in. pipe. The 8-in. leg from Elat to Beersheba was built on a crash basis 3 years ago after Israeli forces invaded Egypt and opened Aqaba to local shipping. Throughput of the system will first be stepped up to 50,000 bbl. daily and later to almost 120,000 bbl. daily.

Concession terms . . . The agreement calls for an investment of $20 million by the Rothschild group, of which $4 million will be in shares and $16 million in 8% perpetual debentures guaranteed by the Israeli Government.

Other participants in the group include the Pereira group of France, and several Swiss and American investors, including Palestine Economic Corp. of New York.

Terms of the 49-year concession give the builders exemption of all local taxes, exemption of equipment from taxes and duty, and exemption of crude and products in transit from local taxes and fees.

After a 15-year free period, graduated tax payments will be made which will finally reach 50% of the net profit. The group also will have priority on sale of products in local markets. The existing 8-in. line and terminal facilities at Elat and Haifa will be taken over by the new group.

Work to start . . . Surveys and planning for the new section have been completed.

Pipe laying is expected to begin this summer. Locally made pipe will be used. Terminal facilities at Elat also will be expanded.

Crude moving through the system will be destined largely for the 85,000-bbl. Haifa refinery, which for years has operated at only a fraction of its capacity. Israel is also pointing out, however, that the system can compete economically with the Suez Canal.

They say experience with the 8-in. line has shown that their Suez "by-pass" is considerably cheaper than hauling Middle East crude to European ports through the waterway. Tankers up to 60,000 tons can use both Haifa and Elat, while the canal is limited to vessels of shallower draft, or ships not fully loaded.

Australian Complex Grows

AFFILIATES of Standard-Vacuum Oil Co. and Goodyear Tire & Rubber Co. will start production of synthetic rubber in Australia within 2 years.

The rubber will be produced at an $11-million plant which will be a unit of a four-plant petrochemical complex near Melbourne. The complex will be supplied with feed stocks by Stanvac's 34,000-bbl. Altona refinery.

Goodyear Tyre & Rubber Co. (Australia) has entered the picture by acquiring a substantial interest in Australian Synthetic Rubber Co., Ltd., which was formed recently by a Stanvac affiliate, Vacuum Oil Co. Pty. Ltd.

Engineering is under way for the rubber plant, for a polyethylene plant to be built and owned by Union Carbide Australia, Ltd., and for a styrene plant to be owned and operated by a company jointly owned by CRS Chemicals, Ltd., and Dow International.

The four plants are expected to be in full operation by mid-1961. The contract for the basic petrochemicals plant which will produce feed stock for the rubber already has been awarded to Fluor International S. A. and Utah Australia Ltd.

India Surveys Gas

- . . . in Upper Assam as feed stock for new industries.

WHEN SHUT-IN fields in Upper Assam finally open, natural gas as well as oil may be produced on a commercial basis.

The Indian Government has set up a committee to study the possibility of tapping large gas reserves in the Nahorkatiya area as a feed stock for fertilizer and as a fuel supply for a local cement industry and power generation.

About 50,000-bbl.-daily crude production is shut in in the Nahorkatiya and Moran license areas of Assam, in northeastern India. But there are also substantial gas supplies available, and some field wells have come in as gas producers. Gas production potential is about 100 million cubic feet daily.

Italian and Japanese firms reportedly are sounding out the government with offers for technical and financial aid on projects. One Italian project calls for utilization of 25 to 30 million cubic feet daily, which would cover Assam's needs for fertilizer, cement, and power.

Refinery progress . . . Preliminary work has started at the site of a 15,000-bbl. refinery to be built with Romanian help at Gauhati, Assam.

Romanian technicians have arrived, a topographical survey of the location has been completed, and ground is being leveled for foundations. A group of about 50 Indians is leaving for Romania this summer for training. The plant is expected to go into operation in 1960, using crude supplies from Nahorkatiya.

Esso Tanker to Move Caribbean LPG to U. S.

A NEW TANKER on its maiden voyage from Monfalcone, Italy, is destined to put LPG shipments on a king-size basis.

The vessel is the "Esso Puerto Rico," a 36,150 tonner that is the largest combination LPG and oil carrier in the world. Fully loaded, it can carry 80,423 bbl. (3,377,766 gal.) of LPG in 58 cylindrical tanks. Another 211,342 bbl. of bulk oil can be carried at the same time.

The task of the tanker is already cut out. Its job will be to carry big shipments of LPG from refineries of Jersey Standard affiliates in the Caribbean to Esso Standard's plant at Bayway, N. J.

Maiden trip . . . The ship is due in New York Harbor on August 2 with a load of fuel oil from Aruba, the first stop on the ship's maiden trip. Esso Tanker Co. is operator of the vessel, which was built in Trieste.

For a few months, the Esso Puerto Rico will be assigned primarily to carry fuel oil or crude from the Caribbean to the East Coast, although small amounts of LPG may be carried on a trial basis. Full-scale shipments are scheduled to start in October, when underground LPG storage caverns at Esso's Bayway refinery are completed. The caverns will hold more than 28 million gallons.

The shipments will consist of a mixture of iso-butane and normal butane. They will be imported under Esso Standard's unfinished products imports quota, which is 10% up to a share of the crude quota. All the product will be run in the fractionating section of the Bayway alkylation unit.

Denmark May Get Refinery

TIDEWATER OIL CO., which last year called off plans for a refinery in Germany, may now build a plant in Denmark.

The company has confirmed that a refinery project is under consideration for Kalundborg, a port on the west side of Sjaelland, the large Danish island on which Copenhagen is located.

Details of the proposed refinery are being kept mum, and the company emphasized that no final decision has been made. So far, talks have been held with the Kalundborg town council, and negotiations are under way for land options.

The Danish refinery would be Tidewater's first in Europe. Last year plans were canceled for a plant at Rees in the heavily industrialized Rhine River area. Industry reports at the time were that the company backed away from the project because of tightening fuel-oil markets.

Tidewater has one other foreign refining interest. This is 49% ownership in the 61,400-bbl. plant of Mitsubishi Oil Co. at Kawaski, Japan.

Imports involved . . . The new proposal appears to be in line with other recent moves in the J. Paul Getty oil empire, of which Tidewater is part. These reflect the problem of living with large foreign crude supplies and a limited market.

Getty Oil Co. has more than 50,000-bbl. daily crude production in the Neutral Zone plus some supplies from Iran. Tidewater, however, can import only 22,100 bbl. daily the rest of the year under its new government quota.

Imports on this level can fill only a fraction of the needs for the 140,000-bbl. Delaware refinery, which was especially designed to operate on foreign oil.

Wildcat Finds Oil

A GUATEMALAN wildcat has yielded a "very encouraging" show of oil.

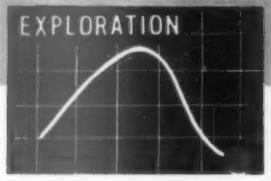
Ohio Oil Co. found the show slightly below 10,000 ft. in a well near Chinaja, in Alta Verapaz in northern Guatemala. Five barrels of good grade crude with no water was recovered. The well is testing the 10 miles long Arruga Grande anticline, located near the mouth of the Rio Dolce River.

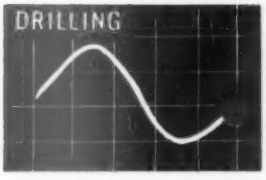
The company plans to continue drilling to a projected depth of 13,000 ft. It is operator on a 109,539-acre concession owned jointly with Continental Oil, Amerada Petroleum and Union Oil Co. of California.

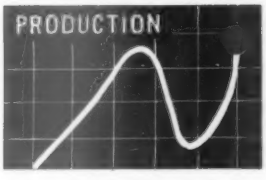
The OIL AND GAS JOURNAL

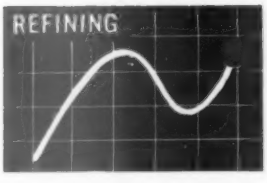
Midyear Report

First-half trends 1954 - 1959









OPERATORS PLAN TO DRILL 27,595 wells in the last half of this year, including 5,568 wildcats and 22,027 development wells . . . Wildcat completions will be up 1,051 wells over the total for the first half . . . Development drilling will show a gain of 2,177 wells for a total increase of 3,228.

TOTAL COMPLETIONS for the first 6 months of the year amounted to 24,367 wells for a gain of 1,379 over last year . . . All of the boost came from development drilling . . . Wildcat completions were down 39 wells.

DOMESTIC DEMAND for petroleum products gained 6.4% over the poor showing for the first half last year . . . Average demand for the year is expected to be up 5.0% . . . Increased industrial activity will give residual fuel the largest percentage increase for a major product, plus 8.6% . . . Gasoline's gain will be 4.3%.

REFINED-PRODUCT IMPORTS hit an all-time high of 1,259,000 bbl. daily in the first quarter of 1959 but declined in the second quarter under quota limitations . . . Crude imports averaged 916,000 bbl. daily for the half, down 2.4%.

CRUDE PRODUCTION averaged 7,180,100 bbl. daily for the first half but still lagged 1957 . . . Gain over last year was 11.1% . . . World production was up 10.4% . . . Output from natural-gasoline and cycling plants averaged 35,856,000 gal. daily for a gain of 9.6%.

REFINERS RAN 7.9% more crude in the first half than last year to set a new first-half record of 8,036,000 bbl. daily . . . Resulting overproduction put pressure on product markets.

PIPELINE CONSTRUCTION may reach 16,500 miles this year. Total will top 1958 but will fall short of the 1957 record . . . Emphasis in refinery construction is on alkylation.

Midyear Report

Reviewing the News

First-half Headline Makers

HISTORIC FIRSTS dotted the first half of oil's centennial year. Biggest headline makers were:

A mandatory imports control program, established by presidential edict.

The revolutionary methane-by-tanker shipments to England.

Key developments in petroleum came thick and fast.

Supply ran a tricky course from heavy refinery runs and too-heavy stocks to drastic production cuts and strong voluntary efforts to get the industry in balance.

Automation picked up speed. Negotiations between labor and management found new levels of agreement and disagreement. Political repercussions came in the Iraq and Middle East areas, the Venezuelan tax hike found overtones in other foreign negotiations.

The first mandatory imports-control program was effective March 11 for crude and April 1 for residual fuel and other products. By May, imports were down to 1,237,000 bbl. daily.

The imports pinch was eased for Canada and Mexico after the program's first weeks. To date, 81 petitions for revisions in import quotas have been filed.

The Constock tanker made two trips to England from Louisiana, laden with 33,000 bbl. of liquefied natural gas. The voyages were watched internationally. Some saw Europe being supplied with natural gas, via tanker, from Africa's lush fields. In Venezuela, building of a liquefaction plant was in the cards, with a vast new natural-gas market envisioned.

THE PICTURE OVERSEAS was a busy one. Argentina's government oil agency, calling for bids on 4,500 wells, saw much exploratory work get under way under its new policy permitting U. S. companies to develop production on a contract basis. Pan American drilled the first of 50 wells projected for the year at Cerro Dragon, 50 miles west of Comodoro-Rivadavia.

Pemex obtained $72 million in new loans from abroad. It set a goal, under Director Gutierrez Roldan, of 477 wells in 1959, 121 of them exploratory.

Australia agreed to pay one-half the cost of four wildcat wells. A Polish wildcat discovery was made in the Carpathian region.

In Venezuela, Dr. Juan Pablo Perez Alfonso was named new minister of mines and hydrocarbons.

Libya blossomed. New wells of important proportions were the rule rather than the exception in the African desert wastes.

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INDUSTRY and the U. S., represented by the Bureau of Mines, still are huddling at arm's length and with varying views on use of nuclear explosions experimentally in underground shale-oil tests proposed for Colorado. Private companies and Uncle Sam would share costs of a test atom blast, under the latest proposal.

Early in the first half, oil economists were busy appraising effect of Venezuela's abrupt tax hike, shattering the so-called 50-50 formula. Activity in drilling continued high in a mild shower of charges and counter charges, which soon subsided. The new tax bite may nick oil companies another $170,000,000 on their last year's over-all tax bill.

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OFFSHORE DRILLING was revived somewhat. Biggest nudge was Louisiana's offshore lease sale, which brought $61,000,000 in bonuses. Prompt testing of the acreage began.

There seemed to be water drilling everywhere. Barges and platforms of many types tapped submerged strata in the Persian Gulf, Mexico's Bay of Campeche, off western Argentina's southernmost coasts, and the California coastlands. Lake Erie attracted additional drilling interest.

An idle tender was converted into a floating drilling barge successfully. California Standard's drilling platform off Summerland, Santa Barbara County, California, was the first and only permanent offshore platform in California. Florida's waters near Key West also drew attention.

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GASOLINE-TAX CHANGES rode a rough course. The proposal for a 1½-cent a gallon federal gasoline-tax increase, urged by the President, didn't get off the ground —but is still a live issue.

Governor Rockefeller in New York made it home through the legislature with a tax increase, to help whittle down a $250-million state deficit.

The federal case against 29 oil companies, charging price fixing, rumbled slowly through a paper avalanche of briefs and clarification orders with Judge Royce Savage looking for ways to expedite it.

An FPC examiner gave a decision—yet to be acted on by the commission—in the Phillips gas case. A system-wide rate approach with allowed return of 9.25% was provided.

A Texas court upheld town-lot and small-tract drilling, approving a case involving a one-fifth acre site. Oklahoma legislature approved a bill making possible 80-acre spacing for oil wells 5,000 to 9,990 ft. deep. Forty-acre spacing now is the rule.

Arkansas' new plan to reimburse companies over a 5-year period for cost of making salt-water installations, by a tax-deductible payout, was put in force.

The 27½% depletion allowance weathered another stormy period in Congress. It remains intact, but those urging it be reduced had no cause to feel they had lost ground. It is due for more hammering by senate opponents in the months to come.

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THE LABOR FRONT was a busy one the first half.

A general 5% wage increase initiated by Sinclair became the industry pattern. Extra cost to oil was estimated at $127,000,000 annually.

Refinery maintenance seemed to gain a new flexibility with craft union lines being mobilized into work teams. There were a half dozen strikes and work stoppages, most of them involving job assignments of refinery employes.

The OCAW began a major organizing drive with tests at refineries of Indiana Standard and Jersey Standard affiliates. Some are still in the mill. Local independent unions have represented workers in these plants. The OCAW found new competition, inside refinery gates, as Teamster Boss James Hoffa made a personal appearance before workers at Esso's Baton Rouge, La., refinery, urging the independent unionists to consider his group. As the second half opened, workers were idled at American Oil's refineries at Texas City and El Dorado, Ark.

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AFTER A PERIOD of doldrums, oil-country goods and rigs and rig parts began moving again. With company tubular-goods inventories depleted, buying started in the first quarter. Bugaboo of a possible steel strike sparked some purchasing. Most of the new rig buying resulted from pickup of foreign activity, although the parts business began an upturn late the first half to reactivate equipment that had been canibalized.

Smaller cars made a bigger dent in the automotive picture. The U. S. big three of General Motors, Ford, and Chrysler rushed models for a late-in-year unveiling push. Effect on gasoline usage? Near nil. The cars use much less fuel but trend indicates the little cars supplement and add to, rather than decrease, the over-all rolling stock.

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SOME COMPANIES moved toward decentralization. Patterns differed. There was much shuffling of personnel and consolidation of district, field, and regional offices as companies sought to tighten their organizations.

There were mergers and outright purchases, some accomplished, some now being worked out. The Skelly-Tidewater proposal now is deep in an organizational stage with committees of both groups working toward an eventual meeting ground for consolidation. Tidewater moved much of its Tulsa office to Houston; Skelly plans transfer of a sizable part of its Kansas City staff to Tulsa in 1960. The Texaco-Superior merger is in the discussion stage.

Continental acquired a two-thirds interest in San Jancinto, Halliburton purchased Otis Engineering in a stock deal, the $200-million Gulf Interstate Gas Co. was sold to Columbia Gas system, its only customer. There were others.

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REFINERY new construction was at low ebb but alkylation capacity moved up with a top of 400,000 bbl. daily by year's end a possibility. Crude runs were slowing at midyear, after heavy throughputs in earlier months boosted stocks beyond demand.

Ashland reopened its Louisville refinery to process excess supplies of crude from the new Green County, Kentucky, field.

Automation cut a bigger swath in the processing plants and in petrochemical installations. Monsanto put the chemical industry's first computer-controlled plant on stream.

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ALL RECORDS were broken at the International Petroleum Exposition, held in May in Tulsa. Sales of equipment were high, attendance topped 530,000 with 2,100 representatives from other countries.

The World Petroleum Congress in New York was a storehouse of new oil information. Hundreds of highly technical and revealing papers were given a world-wide audience.

An industry reference work was Petroleum Panorama, The Oil and Gas Journal's special number in observance of oil's 100th year. It now is at fingertips of people in 48,000 offices, libraries, schools and governmental agencies. Out in January, orders for this textbook of petroleum data still were rolling in at midyear.

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THE PRESIDENT in informal statement urged the U. S. Navy to get out of the oil business, relinquish its four naval reserves. The Interior Department began a series of lease-cancellation actions in Wyoming and Montana against oil companies and individuals accused of holding leases on federal lands in excess of the 46,000 acres permitted in all states except Alaska, where 100,000 is the permitted figure.

Texas Eastern begins excavation of Barbers Hill salt dome to make the world's largest single LPG-storage reservoir. Tennessee Gas Transmission's proposed Chicago line is approved, climaxing 4 years of work with FPC.

Thirty-nine miscible-drive projects either were under way or are projected, a big increase in use of a new recovery tool. Price of gas from Ringwood pool in Oklahoma jumped 3½ cents to 6 cents at wellhead, after long litigation, in out-of-court settlement.

Canada's largest field appeared to be developing in Swan Hills area. Proved reserves already estimated at 308 million barrels. Extensive exploratory drilling programs are in the making.

Thirty field parties may do exploration work in summer months in Alaska. Arctic Slope, Yakataga-Katalla, and Copper River basin are areas of most interest.

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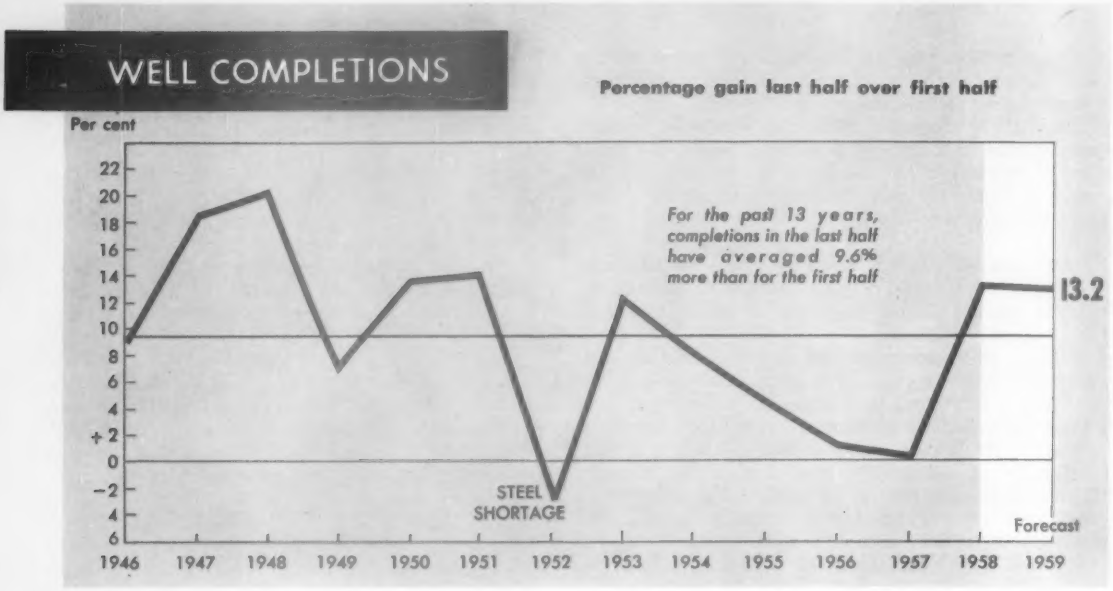
REGULAR GASOLINE, a stable country cousin to the premium and superpremium grades, found a moment of triumph. Union Oil, in California, pushed its regular as the gas for "four out of five" cars. Octane numbers of regular gained widely.

The credit-card push was in evidence. Some companies tied into the Hilton credit-card service, others joined the Diners Club universal card program.

In Texas, an old-fashioned "gusher" came in with tools blown out of a Crockett County well. Gas discoveries in West Virginia and Ohio picked up the Appalachian area interest. South Mississippi got a big deeper drilling play with wells in the 10,000 to 14,000-ft. bracket more than doubling the number drilled a year before.

Plans for the world's first atomic-powered submarine tanker temporarily were shelved. Newer well-logging systems with magnetic recording of seismic signals and high-speed digital computers found favor. The world's first discovery from a floating platform was made in the Gulf of Paria. The Texas-to-Florida pipeline was completed to Miami. The petrochemical industry received a shot in the arm in western Europe with new and enlarged plants going up in the United Kingdom, Belgium, West Germany, and France.



Wildcats will gain in second 6 months

OPERATORS didn't drill many wildcats in the first half, but their reported plans for the coming months promise a better record for the last half.

Also, total completions will be up enough in the last half to give a better percentage increase over the first half than the average since the end of World War II.

Operators completed only 4,517 wildcats in the first 6 months of this year or 39 fewer holes than for the same period last year. Since total completions showed a gain of 1,379 wells, the ratio of wildcats to total drilling skidded to the lowest level since 1948.

However, reports from oil men at midyear indicate a gain in the wildcat percentage for the last half. The Journal's projection of drilling in the last half, based on these reports, calls for 5,568 wildcats out of a total drilling program of 27,595 wells.

If operators carry out these plans, they will complete 20.18% of all wells as wildcats. This ratio is better than either period last year but below the averages for other years back to 1950.

The program of 27,595 wells for the last half represents an increase of 3,228 wells over actual completions in the first half or a boost of 13.2%.

Part of this big percentage gain can be credited to the low level of completions in the early months of the year. Total completions in January averaged 1,050 wells per week, but part of this total represents the tag end of a drilling spurt in December 1958. After January, the weekly average did not get back above a thousand until June. The rate for June was 1,012 wells per week.

The program of 27,595 wells in the last half represents a weekly average of 1,050 wells per week.

Drilling forecast for 1959

(First half actual plus last half forecast)

	Wildcat	Field	Total	Thou. ft.
Alabama	19	72	91	892
Arkansas	142	721	863	2,923
California	371	1,256	1,627	7,631
Colorado	500	341	841	4,454
Florida	4	....	4	33
Illinois	382	2,060	2,442	5,402
Indiana	270	601	871	1,382
Kansas	940	3,113	4,053	14,347
Kentucky	193	2,508	2,701	3,114
Louisiana	565	3,215	3,780	29,542
North	252	1,190	1,442	5,216
South	297	1,636	1,933	20,203
Offshore	16	389	405	4,123
Michigan	144	502	646	1,815
Mississippi	300	350	650	6,009
Montana	136	222	358	1,738
Nebraska	377	471	848	5,124
New Mexico	245	1,647	1,892	7,671
New York	28	216	244	416
North Dakota	118	378	496	3,112
Ohio	32	970	1,002	2,729
Oklahoma	944	5,213	6,157	22,300
Pennsylvania	20	704	724	2,304
South Dakota	7	14	21	137
Texas	3,779	15,636	19,415	81,724
Dist. 1	339	861	1,200	2,872
Dist. 2	269	582	851	5,076
Dist. 3	274	943	1,217	8,625
Dist. 4	356	1,031	1,387	7,098
East	279	942	1,221	5,884
Dist. 7-B	729	2,055	2,784	8,044
West	761	4,931	5,692	27,702
Dist. 9	633	2,972	3,605	10,146
Dist. 10	139	1,319	1,458	6,277
Utah	123	234	357	1,988
West Virginia	25	762	787	1,982
Wyoming	364	628	992	4,860
Miscellaneous	57	43	100	311
Total U. S.	10,085	41,877	51,962	213,940

27,595 wells seen for U. S. in last half

	Forecast last half 1959				Increase over first half 1959			
	Wildcat wells	Field wells	Total wells	Total footage (thou. ft.)	Wildcat wells	Field wells	Total wells	Total footage (thou. ft.)
Alabama	10	34	44	415	1	— 4	— 3	— 62
Alaska	3	3	6	75	— 1	3	2	26
Arizona	14	1	15	52	9	— 1	8	28
Arkansas	76	380	456	1,546	10	39	49	169
California	201	683	884	4,105	31	110	141	579
Colorado	282	193	475	2,515	64	45	109	576
Florida	1	....	1	14	— 2	....	— 2	— 5
Illinois	215	1,200	1,415	3,175	48	340	388	948
Indiana	140	345	485	770	10	89	99	158
Kansas	497	1,597	2,094	7,417	54	81	135	487
Kentucky	118	1,310	1,428	1,608	43	112	155	102
Louisiana	342	1,702	2,044	15,845	119	189	308	2,148
North	158	649	807	2,945	64	108	172	674
South	175	840	1,015	10,640	53	44	97	1,077
Offshore	9	213	222	2,260	2	37	39	397
Michigan	76	265	341	958	8	28	36	101
Mississippi	154	184	338	3,125	8	18	26	241
Montana	83	127	210	1,021	30	32	62	304
Nebraska	201	250	451	2,724	25	29	54	324
New Mexico	136	848	984	4,000	27	49	76	329
West	39	398	437	1,443	7	23	30	111
East	97	450	547	2,557	20	26	46	218
New York	15	100	115	199	2	— 16	— 14	— 18
North Dakota	70	170	240	1,507	22	— 38	— 16	— 98
Ohio	19	521	540	1,472	6	72	78	215
Oklahoma	510	2,770	3,280	11,890	76	327	403	1,480
Pennsylvania	16	397	413	1,270	12	90	102	236
South Dakota	5	10	15	101	3	6	9	65
Texas	2,058	8,052	10,110	42,610	337	468	805	3,496
Dist. 1	186	463	649	1,555	33	65	98	238
Dist. 2	155	295	450	2,689	41	8	49	302
Dist. 3	157	505	662	4,709	40	67	107	793
Dist. 4	196	540	736	3,772	36	49	85	446
East (5 and 6)	165	526	691	3,330	51	110	161	776
Dist. 7-B	390	1,098	1,488	4,300	51	141	192	556
West (7-C and 8)	400	2,390	2,790	13,600	39	—155	—112	—502
Dist. 9	325	1,520	1,845	5,195	17	68	85	244
Dist. 10	84	715	799	3,460	29	111	140	643
Utah	75	110	185	1,030	27	— 14	13	72
West Virginia	15	415	430	1,085	5	68	73	188
Wyoming	220	345	565	2,790	76	62	138	720
Miscellaneous	16	15	31	32	1	— 7	— 6	— 47
Total United States	**5,568**	**22,027**	**27,595**	**113,351**	**1,051**	**2,177**	**3,228**	**12,762**

. . . with Canada adding 1,444 more

Alberta	200	665	865	4,764	3	156	159	850
Saskatchewan	91	379	470	1,985	—29	63	34	145
Manitoba	5	24	29	68	....	10	10	22
British Columbia	50	30	80	406	8	21	29	132
Northwest Territories	....	....	....	....	— 4	....	— 4	— 16
Western Canada	**346**	**1,098**	**1,444**	**7,223**	**—22**	**250**	**228**	**1,133**

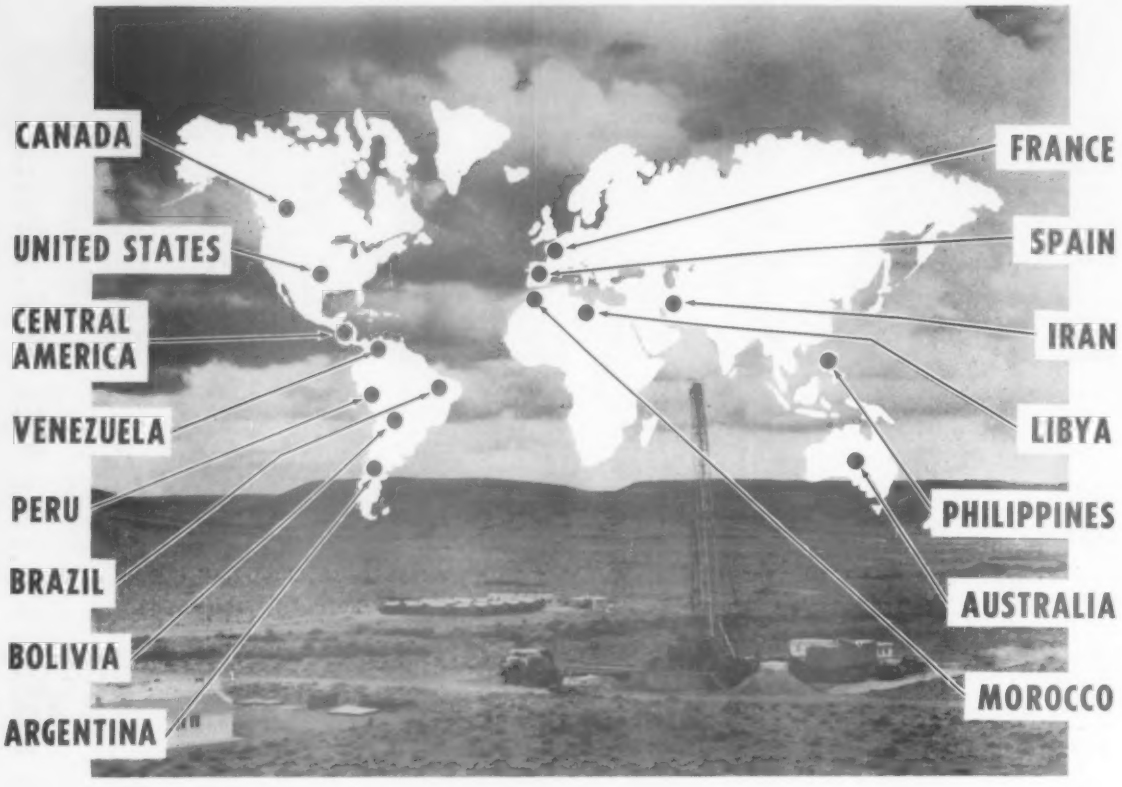
This is a little better than the rate for the last half of 1953 but not quite up to the average reported for the last half of 1954.

The forecast of total drilling may be conservative. Many of the larger operators have added to their drilling programs since the first of the year. On the other hand, reports from a large number of the medium-to-small producers showed fewer wells than they listed in January. This was to be expected.

The midsummer cut in production allowables has reduced producer income, and drilling programs of the smaller operators shift faster than major company plans.

Since small-operator drilling accounts for such a large percentage of the total, the depressing influence of the group more than offsets the increases reported by the larger producers.

The cutback in West Texas drilling for the last half represents a reduction from a high level in the first half. Even with a drop of 112 wells from the first half, the area is expected to end the year with about 540 more holes than in 1958.



Where we'll drill tomorrow . . . and beyond

BOTH aggressiveness and conservatism will feature exploratory drilling in the coming months. There will be new drilling in established producing areas, but a definite advance into entirely new wildcat domains is under way. This bold wildcatting trek isn't as pronounced as in previous years, but it is steady and fairly widespread.

There is also a market return to wildcat frontiers where production was opened a few years ago but where development sagged and died. First-half exploration in one such area, the northeastern Las Animas arch country, uncovered important new oil reservoirs. This trend will increase during the rest of 1959 and into the early '60's.

By surveying the very recent past, and evaluating the present, the near-future exploratory paths will be posted in both old and new areas. Top provinces to watch are the Anadarko, Delaware, Great, Arkansas Valley, Palo Duro, Green River, Williston, and Forest City basins; others are the Las Animas arch, Montana's Disturbed belt, Alaska, the vast western Canada geosyncline, the Mississippi embayment, Texas' Rio Grande embayment, the Pacific Northwest, the Appalachian geosyncline and its Great Lake environs, the long Nemaha granite ridge of the Mid-Continent, and a widespread smattering of overseas hopefuls—Libya and other North African countries, Argentina, and northern Iran to list a few.

The new . . . Spirited wildcatting is under way in many entirely oil-barren regions. This tempo will pick up barring unforeseen obstacles.

. . . In the Great basin. Here is one of North America's biggest future oil provinces. Exploration in the past has hit a forbidding blank wall except for one oil field at Eagle Springs in Nevada. For 2 years sporadic wildcatting has spotted the maps of Arizona, Nevada, and adjoining desert state areas with wildcats —all of them dry. But these dry holes are a must to determine the basin's future prospects. Arizona in particular is in line for a really busy year of exploration. More than a dozen active tests in the state presage more active exploration in this desert wasteland.

. . . Palo Duro. This three-state east-west basin has just a few splotches of oil, but there has been far too little exploration of its potential. There were more wildcats drilled here during the first half of 1959 than in any other comparable period. This exacting type of drilling will certainly make or break one of Texas' last wildcat barriers.

. . . Pacific Northwest. With only one commercial oil pool in a three-state area, this future province lies in wait for much-needed wildcatting. There are many potential areas in Washington, Idaho, and Oregon. Recent leasing of Oregon lands may signal the start

of a new try here. One discovery is all that is needed to make this a busy oil-hunting arena.

... **Forest City basin.** Here is one of the Mid-Continent region's oil "holdouts." There is scattered production in northeastern Kansas, northwestern Missouri, and southeastern Nebraska, but little of any real significance. Yet Forest City is one of the oldest producing basins in the United States. The next few months may see the unfolding of a revival of interest here. One wildcat is on the books near Omaha, others are planned in northeastern Kansas counties. Look for a wildcat to drill in southwestern Iowa.

... **Nemaha ridge.** The northern end of this long Mid-Continent buried mountain range has long been oil-dry, while the southern end has some of the nation's biggest oil fields on its top and flanks. Three discoveries this year in previously dry Kansas counties demand a new look into the possibilities of this granite ridge. The Kansas strikes also help the future of edge-basin drilling in Forest City.

... **Disturbed belt.** This is one of the country's most disappointing hunting grounds. After many years of careful exploring, only one commercial field exists—Blackleaf in Montana. Yet, just a few miles north lie some of the continent's biggest gas fields in Alberta. The Blackleaf discovery last year stirred new interest. This year a commendable campaign is again in gear in Montana's Cascade and Teton areas. These wildcats should be watched closely—if one hits, a scramble to the highly complex Montana foothills will be in order.

... **Las Animas.** Production isn't new here, but it is scattered. In recent years, gas and oil have been found at both ends of this Colorado-Kansas feature, but the past few months have seen its emergence as an oil province. Pennsylvanian oil is being tapped at the northeastern end of the arch in northwest Kansas and southwest Nebraska in rewarding quantities. The big push that began at Llanos last year, and then quieted down, is on again in earnest. The will be one of the busiest exploration scenes for many months to come. The interest will spread down the arch into southeastern Colorado where it has been all too quiet of late. Expect continued wildcatting in the northern reaches of the adjoining Raton basin.

... **Lake Erie.** The United States side of this gas province has but two producers, but a drilling program is rising off the Pennsylvania coast. This will be followed by inspection of the waters off New York, Ohio, and Michigan. This gas search is correlative to the lucrative deep hunt in the nearby Appalachian basin which will gain momentum this second half.

... **Overseas.** Foreign exploration is on the threshold of its most important phase. Important wildcat and geophysical work is widespread in North Africa, the Near East, and South America.

In Libya, where a remote wildcat made 17,500 bbl. per day recently, a huge area is open for exploration. This young oil province stretches 1,000 miles across North Africa. Geologists now say the region is potentially another United States Mid-Continent province.

Geophysics up . . . The Free World's geophysical activity outlook (outside North America) should increase. In the Western Hemisphere the bright spots are Bolivia, Brazil, and Argentina. Argentina will let drilling participation deals on about 7½ million acres. Peru and Venezuela will see less action than usual. Central American countries will keep on the same scale as last year.

Increases are due in Bolivia, Spain, the Spanish Sahara, and Iran. Iran will open up thousands of square miles of its northern interior to foreign explorers with bids due this November 1. Spain has drafted and accepted a new set of oil regulations. Activity should begin here and in the Spanish North African countries this summer. Other prospective active areas are France, Australia, and the Philippines.

The old . . . Important wildcat events are due North America's established producing areas. Some of these so-called older provinces, however, still have lots to offer the explorer.

... **Anadarko.** This five-state Mid-Continent oil bowl is perhaps the leading exploratory stage in the United States today. Rigs are working every corner of the basin and in all of the five states. The southeast corner of the basin has long had production, but the northwestern part of the huge area is enjoying a very high wildcat success ratio. There are many thousands of square miles still untouched by the drill.

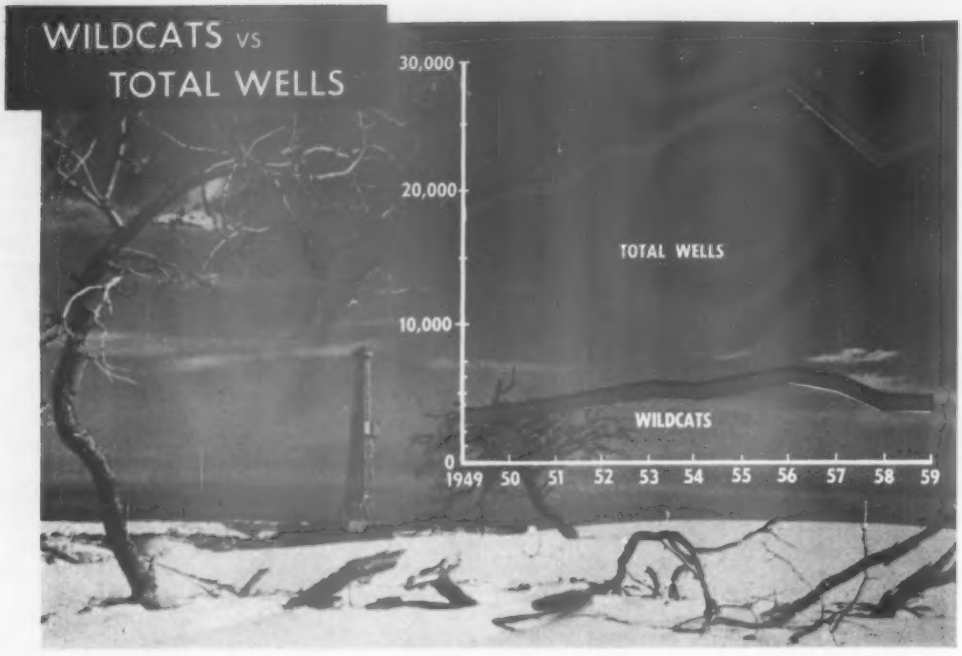
... **Delaware.** This far-western Texas paradox, long a producer in the shallow zones, is on the brink of a deep drilling era. The ultradeep zones below shallow fields are being tested in the established producing trends, while the remote unknown edges and central portion of the basin are gradually coming into wildcat prominence. The discovery of Wolfcamp oil at a deep well in Pecos County this summer will certainly inject new hope into this big basin.

Coupled with this interest in the Delaware is the increased drilling activity in the Val Verde basin and the northern portion of the Rio Grande embayment.

... **Rocky Mountains.** Remote wildcatting has always been the trend in this province of many basins, but this year the advance is confined mostly to Wyoming and the Williston and San Juan basins. The Green River basin is one ofthe country's big gas targets and will remain so. New-pay oil production features San Juan drilling success, while the big strikes in southwestern Colorado's portion of the Paradox basin should spark needed drilling there. Williston basin exploration is cornered in Burke and Bottineau counties in North Dakota for the most part. Williston remains as one of the biggest and most untested provinces in the business.

... **Gulf Coast.** From the upper Rio Grande embayment to South Mississippi, exploration will thrive. Wildcatting will center in Southwest and South Texas, and in the deep reaches of the Lower Cretaceous and Jurassic rocks of Mississippi. Inland development will continue stable in South Louisiana and along the Gulf Coast of Texas.

... **Offshore.** Gulf of Mexico operators will take a third look at their hole cards in offshore Louisiana operations. In California, where first big offshore oil was found last year, drilling is moving slowly but should pick up.



Completions reverse downward trend

WILDCAT COMPLETIONS in the nation stopped the downward trend that began 2 years ago, coming out of the dark spiral to an even keel with the previous year's first-half score. Total well completions showed a heartening first-half gain over 1958, with field-well tallies leading the way.

The improvement in exploratory drilling was accompanied by successful and significant wildcatting throughout the nation's many provinces, and in western Canada. Despite a trend toward more exacting exploration, wildcatters continued to march into the unknowns of many of our barren or near-barren provinces. Big successes were recorded in western Canada, Texas, the Mid-Continent, Appalachians, Mississippi, Wyoming, and North Dakota. Daring oil-hunters moved into remote southwestern wildcat confines from South Texas westward to Nevada. In the Far North explorers tapped huge new gas reserves in British Columbia, enlarged one of Canada's biggest oil reservoirs at Swan Hills, and continued the search for oil in Alaska.

The Mid-Continent story . . . This province takes honors for the first place in widespread and successful exploration during the first half. New areas were opened to production, older areas were deepened and enlarged, and back-country wildcatting resulted in important discoveries and record-building exploration.

. . . Anadarko basin. This vast five-state basin maintained its lead over the nation's busy oil provinces. Every one of the five-states in the basin figured in the area's drilling foray. The Oklahoma and Texas panhandles enjoyed their most active period since the pre-Permian play began some 10 years ago. New Pennsylvanian gas, oil, and gas-condensate reserves were tapped throughout the northern tier of the Texas Panhandle counties and across the three-county Oklahoma Panhandle.

Southeast of the Panhandle success, the most important discovery of the year popped up in Oklahoma's Custer County. Magnolia Petroleum Co. opened a prolific Hunton-Siluro-Devonian gas-condensate reserve in the deep portion of the basin, setting up the beginning of a new drilling era for Anadarko.

. . . Kansas-Nebraska. The arch country in northwestern Kansas and southwestern Nebraska apparently is the nation's newest oil prize. This new province got its start last year at Llanos field in Sherman County, Kansas, but it wasn't until this spring and summer that the area really got its confirming discoveries. Both the Nebraska and Kansas portion of the triangle of Pennsylvanian production that lies between the Las Animas and Cambridge arches had good strikes. Development is brisk around these new finds at Cahoj in Kansas and Reiher in Nebraska.

Widespread Texas action . . . Nearly every corner of Texas was busy, but the most important exploration took place in the far southwest, far west, in the lower Rio Grande embayment, in the Palo Duro and Matador arch province, and in the southeastern counties.

. . . Delaware basin. Magnolia may have revived deep-drilling interest in the Pecos area as a result of

Where wells were completed in first half

	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total Jan.-June 1958
Alabama	47	36	0	0	11	0	477,552	42
Alaska	4	1	0	0	3	0	49,306	0
Arizona	7	1	0	0	6	0	24,202	10
Arkansas	407	229	0	16	158	4	1,377,467	324
California	743	486	0	27	221	9	3,525,640	850
Colorado	366	61	1	32	270	2	1,938,674	364
Florida	3	0	0	0	3	0	18,945	3
Illinois	1,027	455	0	5	456	111	2,227,450	969
Indiana	386	130	0	8	242	6	611,638	341
Kansas	1,959	907	6	77	926	43	6,930,507	1,814
Kentucky	1,273	736	0	157	357	23	1,506,118	474
Louisiana	1,736	855	158	77	641	5	13,696,789	1,657
North	635	333	2	61	239	0	2,270,881	579
South	918	417	134	12	350	5	9,563,040	854
Offshore	183	105	22	4	52	0	1,862,868	224
Maryland	1	0	0	1	0	0	4,811	2
Michigan	305	98	0	40	145	22	856,700	184
Mississippi	312	121	14	1	176	0	2,884,155	192
Missouri	1	1	0	0	0	0	1,460	1
Montana	148	81	0	1	66	0	716,657	183
Nebraska	397	135	0	0	262	0	2,399,811	336
Nevada	1	0	0	0	1	0	2,600	1
New Mexico	908	580	20	144	163	1	3,670,633	929
West	407	215	13	132	47	0	1,332,266	431
East	501	365	7	12	116	1	2,338,367	498
New York	129	72	0	3	12	42	216,953	278
North Dakota	256	165	1	0	90	0	1,604,672	211
Ohio	462	197	0	138	93	34	1,256,899	512
Oklahoma	2,877	1,421	67	196	1,139	54	10,410,123	3,217
Oregon	1	0	0	0	1	0	1,801	0
Pennsylvania	311	77	0	177	24	33	1,033,612	230
South Dakota	6	4	0	0	2	0	36,550	6
Tennessee	21	3	0	0	18	0	16,704	18
Texas	9,305	5,219	335	376	3,169	206	39,114,593	8,939
District 1	551	281	6	17	247	0	1,317,388	497
District 2	401	98	62	59	182	0	2,386,731	390
District 3	555	226	74	14	240	1	3,916,587	653
District 4	651	203	60	76	300	12	3,326,144	602
East (5 and 6)	530	276	46	5	201	2	2,554,371	598
District 7-B	1,296	621	6	26	627	16	3,743,562	1,165
West (7-C and 8)	2,902	2,157	36	28	613	68	14,101,641	2,652
District 9	1,760	949	9	54	647	101	4,951,330	1,766
District 10	659	408	36	97	112	6	2,816,839	616
Utah	172	109	0	6	57	0	957,886	203
Virginia	11	0	0	10	1	0	43,347	4
Washington	1	0	0	0	1	0	8,015	3
West Virginia	357	49	0	241	56	11	896,644	339
Wyoming	427	170	0	40	202	15	2,069,795	350
Total 6 mos. 1959	**24,367**	**12,399**	**602**	**1,773**	**8,972**	**621**	**100,588,709**	....
Total 6 Mos. 1958	22,988	11,385	563	1,706	8,801	533	97,068,371	*22,988

*Incl. Ga. 1, S. C. 1.

Western Canada's score: 1,216 wells, 6,090,510 ft.

Western Canada	1,216	696	....	126	392	2	6,090,510	1,222
Alberta	706	379	....	105	220	2	3,914,208	757
Saskatchewan	436	294	....	4	138	0	1,840,327	348
Manitoba	19	15	....	0	4	0	45,986	58
B. C.	51	8	....	17	26	....	274,088	52
N. W. T.	4	0	....	0	4	....	15,901	7
Ontario	102	2	....	36	51	13	122,860	....

its Wolfcamp discovery northwest of Fort Stockton early in June. The well flowed 200 bbl. in 15 minutes during early tests. But the important thing about this wildcat is that it will stir lagging action in this big basin of deep oil secrets.

... Far West Texas. The northern edge of the Val Verde basin is the scene of deep exploration brought about by the Brown-Bassett multipay-field discovery of last year. This deep-drilling trend extends on down into the basin proper and into the upper end of the Rio Grande embayment where other deep wildcats are going down.

... South Texas. Big gas-condensate and oil reserves are being tapped this year at the southwestern extension of the growing Wilcox trend in Zapata and northeastern Webb counties. The play is a continuation of last year's push farther northeast.

Big Frio oil pools are being tapped in King Ranch country in the Kleberg County area. North Alazan is one of the best new finds in some time, promising to spark a needed push into the deeper part of the Rio Grande embayment. This field also points up the fact that many big Frio fields still lie in wait for the drill in South Texas.

... Southeast. Jefferson and Galveston counties enjoyed the same development success as last year with prolific gas-condensate wells being added regularly. Focal points of action are Alta Loma and Port Acres.

... Palo Duro. Here is one of Texas' last wildcat barriers. Only three small pools are known in this long east-west three-state basin. During the first half more wildcats were drilled in this virgin country than at any other comparable period. None found anything, but the play continues strong. Some interesting shows were reported at scattered wildcats in Palo Duro and adjoining Dalhart basins.

The Appalachians ... This is one of oil's surprise areas. After many, many years of stagnant exploration, 1958 and 1959 should go down as the real birth years of drilling in this big province. The spritely old area is one of the nation's busiest and most promising. Green County in Kentucky perhaps has all other areas beaten newswise with its 1,100 shallow wells, but the real story lies in the spirited deep wildcatting campaign under way throughout Ohio, West Virginia, New York, Kentucky, and Pennsylvania. Two depth records were shattered—one in Kentucky at 13,172 ft. (the state's deepest), and the other in New York at 13,500 ft. (the regional contender).

Mississippi ... This state's deep-drilling swath is deeper and wider than ever before. Lower Cretaceous and Jurassic exploration kept more than 30 rigs busy during the first half. Most wells are projected to depths of below 15,000 ft. South Mississippi's deep play resulted in at least seven new fields and the opening of additional productive zones and major extensions in and around many others. Successful Jurassic exploration makes this section a lucrative goal.

The Rockies ... Most of this region's activity centered in Wyoming's Green River basin and in the North and South Dakota portions of the Williston basin.

... Wyoming. A flurry of gas discoveries in Green River basin set off a drilling spurt that could well set new state and regional records this year. An even dozen gas strikes dotted the central and western portions of this big gas basin. Nearly two dozen new units were approved and drilling has begun.

... Williston. South Dakota's Harding County Buffalo area gained three oil producers during the first half. There are half a dozen active locations in this

First-half completions—wells

	Jan.	Feb.	Mar.	Apr.	May	June
Wildcats						
Oil	88	84	76	65	71	66
Cond.	13	7	13	11	9	10
Gas	31	27	22	24	12	19
Dry	831	524	629	629	600	656
Total	963	642	740	729	692	751
Development						
Oil	2,215	1,688	1,819	2,023	1,998	2,206
Cond.	111	74	87	110	71	86
Gas	283	238	254	287	298	278
Dry	970	748	763	856	841	925
Service	112	100	104	100	116	89
Total	3,691	2,848	3,027	3,376	3,324	3,584
Total Wells						
Oil	2,303	1,772	1,895	2,088	2,069	2,272
Cond.	124	81	100	121	80	96
Gas	314	265	276	311	310	297
Dry	1,801	1,272	1,392	1,485	1,441	1,581
Service	112	100	104	100	116	89
Total	4,654	3,490	3,767	4,105	4,016	4,335

... and footage—by months

	Jan.	Feb.	Mar.	Apr.	May	June
Wildcat	4,853,571	3,186,957	3,619,498	3,597,588	3,220,128	3,802,262
Development	14,871,194	11,452,672	12,413,389	13,489,066	12,870,045	13,212,339
Total	19,724,765	14,639,629	16,032,887	17,086,654	16,090,173	17,014,601

First-half completions—field wells . . . and wildcats

	Field-well completions							Wildcat wells					
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage
Alabama	38	36	0	0	2	0	439,533	9	0	0	0	9	38,019
Alaska								4	1	0	0	3	49,306
Arizona	2	1	0	0	1	0	12,033	5	0	0	0	5	12,169
Arkansas	341	224	0	15	98	4	1,089,802	66	5	0	1	60	287,665
California	573	470	0	19	75	9	2,586,495	170	16	0	8	146	939,145
Colorado	148	49	1	18	78	2	807,059	218	12	0	14	192	1,131,615
Florida								3	0	0	0	3	18,945
Illinois	860	438	0	5	306	111	1,907,792	167	17	0	0	150	319,658
Indiana	256	120	0	8	122	6	412,634	130	10	0	0	120	199,004
Kansas	1,516	852	6	65	550	43	5,255,264	443	55	0	12	376	1,675,243
Kentucky	1,198	715	0	157	303	23	1,399,335	75	21	0	0	54	106,783
Louisiana	1,513	833	149	68	458	5	11,600,968	223	22	9	9	183	2,095,821
North	541	318	2	53	168	0	1,702,545	94	15	0	8	71	568,336
South	796	410	126	11	244	5	8,116,725	122	7	8	1	106	1,446,315
Offshore	176	105	21	4	46	0	1,781,698	7	0	1	0	6	81,170
Maryland	1	0	0	1	0	0	4,811						
Michigan	237	94	0	38	83	22	616,329	68	4	0	2	62	240,371
Mississippi	166	106	12	0	48	0	1,533,384	146	15	2	1	128	1,350,771
Missouri	1	1	0	0	0	0	1,460						
Montana	95	75	0	1	19	0	456,655	53	6	0	0	47	260,002
Nebraska	221	118	0	0	103	0	1,353,253	176	17	0	0	159	1,046,558
New Mexico	799	560	15	141	82	1	3,121,300	109	20	5	3	81	549,333
West	375	209	9	130	27	0	1,162,417	32	6	4	2	20	169,849
East	424	351	6	11	55	1	1,958,883	77	14	1	1	61	379,484
Nevada								1	0	0	0	1	2,600
New York	116	72	0	2	0	42	153,040	13	0	0	1	12	63,913
North Dakota	208	151	1	0	56	0	1,311,449	48	14	0	0	34	293,223
Ohio	449	193	0	136	86	34	1,211,822	13	4	0	2	7	45,077
Oklahoma	2,443	1,363	59	167	800	54	8,406,835	434	58	8	29	339	2,003,288
Oregon								1	0	0	0	1	1,801
Pennsylvania	307	77	0	175	22	33	1,008,713	4	0	0	2	2	24,899
South Dakota	4	4	0	0	0	0	34,373	2	0	0	0	2	2,177
Tennessee	9	1	0	0	8	0	4,251	12	2	0	0	10	12,453
Texas	7,584	5,076	296	349	1,657	206	30,795,332	1,721	143	39	27	1,512	8,319,261
District 1	398	280	6	16	96	0	911,249	153	1	0	1	151	406,139
District 2	287	88	56	50	93	0	1,673,970	114	10	6	9	89	712,761
District 3	438	233	59	11	144	1	2,888,620	117	3	15	3	96	1,027,967
District 4	491	189	55	74	161	12	2,420,977	160	14	5	2	139	905,167
East	416	271	45	5	93	2	1,945,872	114	5	1	0	108	608,499
District 7-B	957	582	4	20	335	16	2,641,439	339	39	2	6	292	1,102,123
West	2,541	2,134	31	26	282	68	12,068,704	361	23	5	2	331	2,032,937
District 9	1,452	907	9	51	384	101	3,791,145	308	42	0	3	263	1,160,185
District 10	604	402	31	96	69	6	2,453,356	55	6	5	1	43	363,483
Utah	124	106	0	3	15	0	692,533	48	3	0	3	42	265,353
Virginia	11	0	0	10	1	0	43,347						
Washington								1	0	0	0	1	8,015
West Virginia	347	49	0	233	54	11	849,084	10	0	0	8	2	47,560
Wyoming	283	165	0	27	76	15	1,199,819	144	5	0	13	126	869,976
Six mos. 1959	**19,850**	**11,949**	**539**	**1,638**	**5,103**	**621**	**78,308,705**	**4,517**	**450**	**63**	**135**	**3,869**	**22,280,004**
Six mos. 1958	18,432	10,950	489	1,562	4,898	533	75,515,615	4,556	435	74	144	3,903	21,552,756

. . . and Canadian completions

Western Canada	848	644	. . .	93	109	2	4,120,171	368	52	. . .	33	283	1,970,339
Alberta	509	349	. . .	87	71	2	2,714,514	197	30	. . .	18	149	1,199,694
Saskatchewan	316	277	. . .	2	37	0	1,337,333	120	17	. . .	2	101	502,994
Manitoba	14	14	. . .	. . .	. . .	. . .	31,136	5	1	. . .	0	4	14,850
British Columbia	9	4	. . .	4	1	0	37,188	42	4	. . .	13	25	236,900
N. W. T.	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4	0	. . .	0	4	15,901
Ontario	102	2	. . .	36	51	13	122,860	. . .	. . .	. . .	. . .	. . .	. . .

First-half footage—development . . . and wildcat wells

	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	416,234			23,299					38,019
Alaska						12,046			37,260
Arizona	5,513			6,520					12,169
Arkansas	673,228		72,680	336,994	6,900	26,759		5,815	255,091
California	1,955,954		88,097	500,213	42,231	124,522		44,826	769,797
Colorado	263,446	4,915	111,213	417,507	9,978	61,417		95,109	975,089
Florida									18,945
Illinois	1,020,398		3,821	705,372	178,201	48,033			271,625
Indiana	197,972		7,103	197,861	9,698	14,748			184,256
Kansas	2,869,899	33,806	240,036	1,964,078	147,445	232,256		66,933	1,376,054
Kentucky	519,309		445,095	415,614	18,317	24,819			81,964
Louisiana	5,725,977	1,836,169	402,347	3,611,192	25,283	186,013	116,741	81,509	1,711,558
North	768,593	17,640	251,933	664,379		110,109		70,789	387,438
South	3,904,626	1,569,035	105,144	2,512,637	25,283	75,904	102,431	10,720	1,257,260
Offshore	1,052,758	249,494	45,270	434,176			14,310		66,860
Michigan	253,443		98,187	203,859	60,840	17,100		8,733	214,538
Maryland			4,811						
Mississippi	1,025,338	104,897		403,149		151,092	24,572	1,455	1,173,652
Missouri	1,460								
Montana	363,047		2,760	90,848		31,791			228,211
Nebraska	729,418			623,835		104,535			942,023
New Mexico	2,165,737	112,826	520,249	319,462	3,026	105,937	36,989	24,192	382,215
Nevada									2,600
New York	91,512		5,608		55,920			3,299	60,614
North Dakota	984,914	11,725		314,810		80,120			213,103
Ohio	576,158		332,084	208,479	95,101	13,513		8,140	23,424
Oklahoma	4,488,904	436,795	910,687	2,424,335	146,114	348,542	64,260	206,673	1,383,813
Oregon									1,801
Pennsylvania	144,153		739,837	74,765	49,958			15,249	9,650
South Dakota	34,373								2,177
Tennessee	454			3,797		3,740			8,713
Texas	19,705,689	2,499,676	1,568,219	6,544,780	476,968	807,874	344,298	126,985	7,040,104
Dist. 1	515,105	60,149	82,912	253,083		2,005		3,389	400,745
Dist. 2	456,539	443,475	247,689	526,267		67,989	53,104	40,618	551,050
Dist. 3	1,314,175	617,918	77,146	874,770	4,611	30,796	160,089	19,962	817,120
Dist. 4	834,469	419,564	339,171	805,137	22,636	101,616	39,746	14,015	749,790
East	1,119,290	317,603	24,847	480,472	3,660	34,269	7,613		566,617
Dist. 7-B	1,636,359	14,474	59,944	900,947	29,715	140,130	10,560	22,860	928,573
West	10,055,886	314,353	137,959	1,375,514	184,992	180,228	27,424	7,620	1,817,665
Dist. 9	2,217,104	62,287	294,183	997,755	219,816	203,381		15,376	941,428
Dist. 10	1,556,762	249,853	304,368	330,835	11,538	47,460	45,762	3,145	267,116
Utah	607,395		2,868	82,270		18,415		13,754	233,184
Virginia			38,436	4,911					
Washington									8,015
West. Va.	101,908		594,476	125,663	27,037			38,620	8,940
Wyoming	739,244		148,382	294,328	17,865	37,595		108,381	724,000
Total U. S.	45,661,077	5,040,809	6,336,996	19,898,941	1,370,882	2,450,867	586,860	849,673	18,392,604

. . . and in Canada

Western Canada	3,240,419		356,611	514,782	8,359	317,676		208,984	1,443,679
Alberta	2,019,929		333,753	352,473	8,359	234,338		125,148	840,208
Sask.	1,174,222		4,544	158,567		65,850		5,729	431,415
Manitoba	31,136					2,105			12,745
B. C.	15,132		18,314	3,742		15,383		78,107	143,410
N.W.T.									15,901

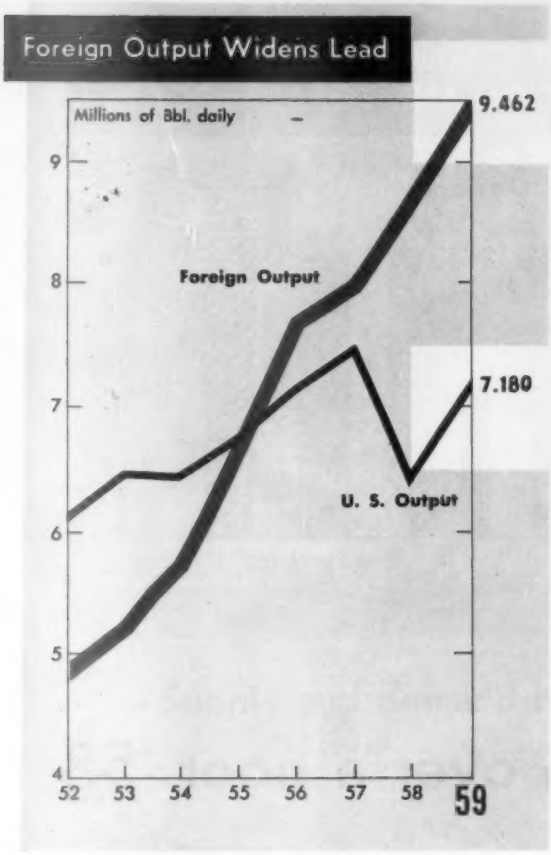
area this summer—the highest number since Buffalo's discovery several years ago.

North Dakota's Burke and Bottineau counties continue to lead Williston activity. Success ratio is high, particularly in Burke County where seven new fields or major extensions were put on the score sheet.

Western Canada . . . Northeastern British Columbia's huge new gas reserves and the phenomenal success of Alberta's Swan Hills Middle Devonian giant retained top choice for Canadian exploratory success laurels.

Far Southwest . . . There are more rigs running in Arizona and the adjoining remote wildcat lands of Nevada, southwestern Utah, and western New Mexico than at any other time. The Arizona search netted an extension discovery in the Boundary Butte area, while the other wildcatting gives us much-needed appraisals of completely oil-barren territory.

Four Corners . . . Southwestern Colorado made news here with the big Towaoc Pennsylvanian discovery of Texaco, Inc., at 1 Ute Mountain Tribal. This well flowed 1,236 bbl. daily, giving the Colorado portion of the basin its first real hope of joining neighboring southeastern Utah in the Paradox march. Lion Oil Co. followed with another big Pennsylvanian find.



U. S. oil accounts for 43% of total

FOREIGN crude production widened the gap over domestic output the first half of the year.

Despite a gain of about 715,000-bbl. daily from U. S. fields, other free-world areas had even greater increases totaling more than 900,000 bbl. daily.

All major exporting areas showed gains. In the Western Hemisphere, operators in Venezuela averaged about 2,890,000 bbl. daily, after passing the 3-million-barrel-daily mark during winter. There also was some improvement from the slump in Canadian fields.

Middle East output reached an all-time peak of close to 4.5 million barrels daily, with gains shared by Kuwait, Saudi Arabia, Iran, and Iraq. Kuwait alone in 1 month produced more than 1.5 million barrels daily. Iran approached the 1-million-barrels-daily mark in individual months.

French production in Africa of 27,900 bbl. daily was only a small fraction of the shut-in potential. With the expected completion of 24-in.-pipeline outlets from Algeria's Hassi Messaoud and Edjele areas this year and next, the French Sahara should soon be making itself felt as a major oil country.

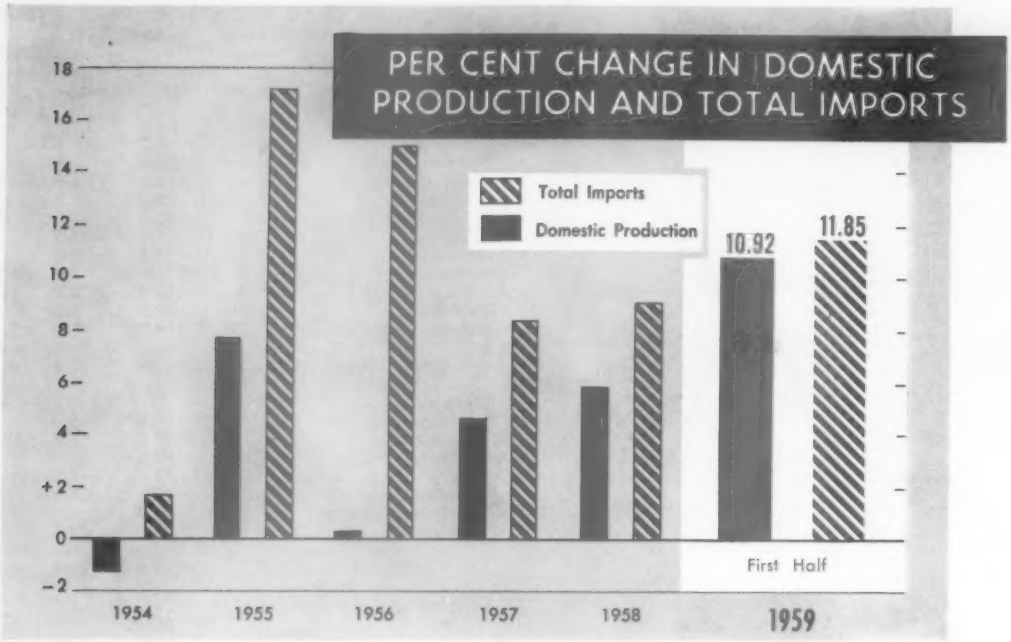
WORLD-WIDE CRUDE PRODUCTION: DAILY AVERAGE IN THOUSANDS OF BARRELS

Country	First 6 months 1959	First 6 months 1958	Per cent change	First 6 months 1957
Western Hemisphere:				
Argentina	120.0	93.5	28.3	91.6
Bolivia	8.3	9.8	–15.3	9.6
Brazil	53.5	45.3	18.1	22.7
Canada	497.6	449.2	10.8	525.5
Chile	15.7	14.5	8.3	11.1
Colombia	140.0	126.1	11.0	125.1
Cuba	0.6	1.1	–45.5	1.1
Ecuador	8.1	8.8	– 8.0	8.3
Mexico	270.0	251.4	7.4	240.1
Peru	49.3	50.5	– 2.4	52.0
Trinidad	109.0	99.7	9.3	90.4
Venezuela	2,890.0	2,514.0	15.0	2,899.1
Total	**4,162.1**	**3,663.9**	**13.6**	**4,076.6**
Europe:				
Austria	46.0	55.0	–16.4	61.7
France	29.0	27.0	7.4	28.6
West Germany	95.6	83.6	14.4	75.0
Italy	28.1	29.4	– 4.4	21.9
Netherlands	31.8	29.7	7.1	26.8
United Kingdom	1.7	1.7	...	1.7
Yugoslavia	10.8	8.6	25.6	7.5
Total	**243.0**	**235.0**	**3.4**	**223.2**
Middle East:				
Bahrain	45.1	38.1	18.4	30.1
Iran*	895.0	809.5	10.6	688.0
Iraq†	807.0	662.6	21.8	337.6
Israel	2.0	1.2	66.7	1.2
Kuwait	1,425.0	1,364.7	4.4	1,030.1
Neutral Zone	108.0	70.3	53.6	46.6
Qatar	171.3	171.3	...	125.6
Saudi Arabia	1,040.0	991.3	4.9	893.9
Turkey	6.5	6.3	3.2	5.6
Total	**4,499.9**	**4,115.3**	**9.3**	**3,158.7**
Other Asia:				
British Borneo	106.9	106.9	...	118.5
Burma	8.1	8.1	...	6.7
India	8.6	8.6	...	9.3
Indonesia	320.0	317.9	0.7	291.5
Japan	7.0	7.0	...	6.0
New Guinea	4.8	4.8	...	6.6
Pakistan	6.0	6.0	...	5.8
Total	**461.4**	**459.3**	**0.5**	**444.4**
Africa:				
Algeria	13.0	7.2	80.1	0.4
Angola	0.8	0.2	300.0	...
Egypt	61.0	57.9	5.4	38.1
Gabon	13.2	7.7	71.4	2.1
Morocco	1.7	1.5	13.3	1.6
Nigeria	6.6	4.8	37.5	...
Total	**96.3**	**79.3**	**21.4**	**42.2**
Free World:				
Foreign	9,462.7	8,552.8	10.6	7,945.1
United States	7,180.1	6,464.1	11.1	7,472.2
Total	**16,642.8**	**15,016.9**	**10.8**	**15,417.3**
Communist Countries in Soviet Orbit:				
Romania	235.0	229.0	2.6	223.0
Russia	2,420.0	2,230.0	8.5	1,860.0
Others	60.0	60.0	...	50.0
Total	**2,715.0**	**2,519.0**	**7.8**	**2,133.0**
WORLD TOTAL	**19,357.8**	**17,535.9**	**10.4**	**17,550.3**

*Includes estimated 5,000-bbl. daily from Naft-i-Shah field not operated by consortium companies.

†Includes estimated 3,300 bbl. daily from Naft Khaneh field, operated by Iraq Government.

First half 1958 production partially estimated on basis of actual reports for most countries through April or May. Communist countries in Soviet orbit include European satellites and Red China.



Demand gains 6.4% over a poor '58

DOMESTIC DEMAND for petroleum products averaged 9,562,000 bbl. daily for the first half of this year compared with 8,983,000 bbl. daily for the same period last year. The last half should reach 9,468,000 bbl. daily.

This year's first-half total represents a gain of 579,000 bbl. daily or 6.4% over the first half of 1958. But not all of this difference can be classified as net gain. Last year was a poor year. In fact, there had been very little first-half gain in demand since 1956.

The erratic pattern of demand in recent years has made it difficult for refiners to follow a definite supply program. For example, the demand increase for the first half of 1955 was 112,000,000 bbl. more than the gain reported for 1957. Demand this year was 105,000,000 bbl. above the total for the first half last year.

Most of the first-half gain this year can be credited to gasoline and residual fuel. Gasoline was up 182,000 bbl. daily and residual gained 249,000 bbl. daily. But again, increases this year are calculated from abnormally low levels last year. Residual was down 144,000 bbl. daily last year, and gasoline showed a gain of only 2,000 bbl. daily.

Supply also moved up this year. Total new supply of all oils averaged 9,866,000 bbl. daily for an increase of 985,000 bbl. daily over the first half of 1958.

This spread between the gains for supply and demand shows up in stocks. Inventories of crude and products decreased 66.4 million barrels last year and increased an estimated 9.8 million barrels this year. Thus, there was a net difference of 76.2 million barrels between stock changes last year and this year.

On the supply side, oil men produced almost 130 million more barrels of crude this year than last, representing the difference between slightly high production this year and severe reductions last year. Output of natural-gas liquids was up about 13.6 million barrels.

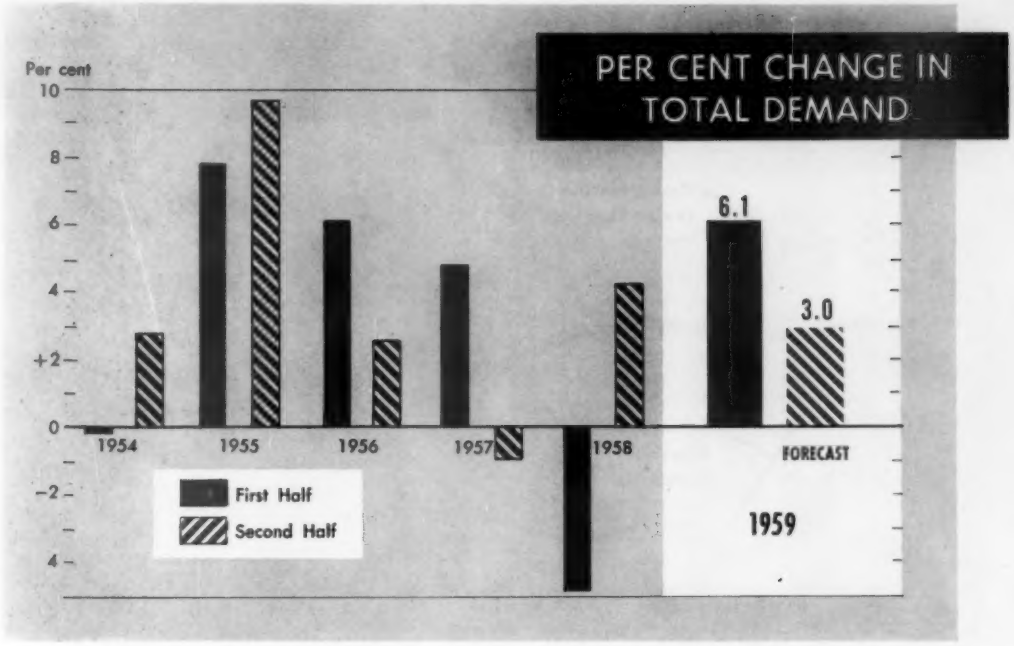
Total imports gained 35 million barrels. There was a slight reduction in crude imports, but this was more than offset by the gain in receipts of foreign products during the first quarter. Product imports averaged 1,260,000 bbl. daily for the first 3 months of the year.

The demand forecast for the last half of 1959 and the first quarter of 1960 is based on a continuation of the steady increase in general economic activity. On a constant-dollar basis, gross national product may show a gain of as much as 7% this year, which will call for moderate-to-good gains in the last half.

The forecast assumes no prolonged steel strike. Such a strike would result in a direct reduction in demand for residual fuel and an indirect depressing effect on demand for gasoline.

Residual fuel may be in tight supply this winter. The forecast of slight reduction in residual demand for the winter quarters compared with last winter is based on two assumptions. First, imports will be limited. And second, prices high enough to develop large additions to the domestic supply probably would shift some users to coal.

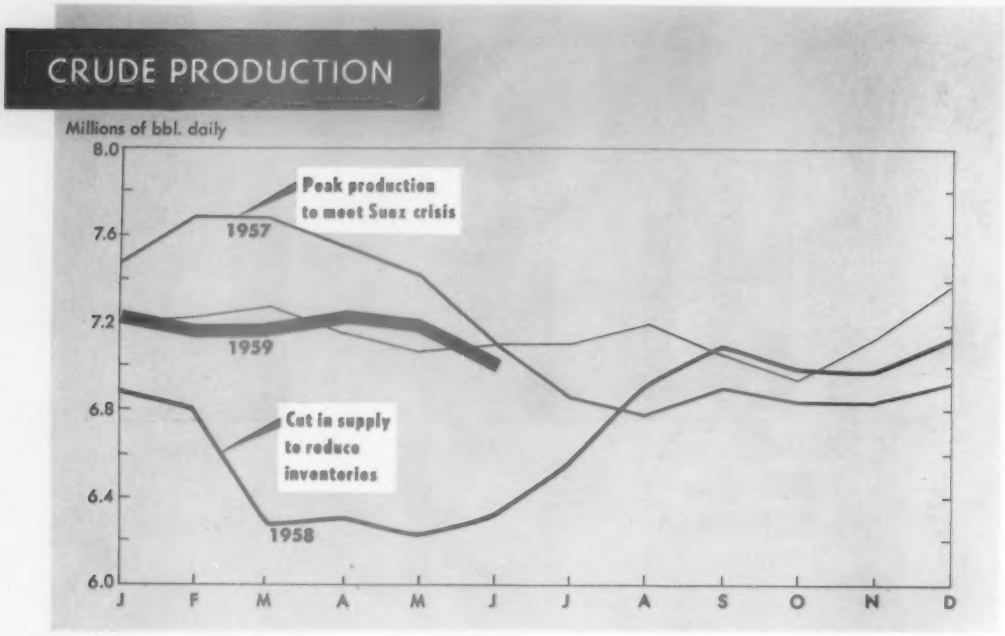
Domestic demand for all products will top 10,000,000 bbl. daily in the fourth quarter and will move up another 600,000 bbl. daily in the first quarter of 1960. The gain over last winter will be about 2.8%.



Supply and demand by products and quarters

	First half Volume*	First half % inc. over 1958	Third quarter Volume*	Third quarter % inc. over 1958	Fourth quarter Volume*	Fourth quarter % inc. over 1958	Year 1959 Volume*	Year 1959 % inc. over 1958	1st quar. 1960 Volume*	1st quar. 1960 % inc. over 1959	1959-60 Winter quarters volume
Total demand	**9,812**	**6.1**	**9,117**	**3.7**	**10,316**	**2.4**	**9,764**	**4.5**	**10,893**	**2.4**	**10,603**
Domestic	9,562	6.4	8,856	4.3	10,080	2.8	9,515	5.0	10,680	2.8	10,378
Export	250	— 5.7	261	—16.5	236	—12.6	249	— 9.8	213	—14.5	225
Gasoline demand	4,013	4.8	4,370	3.4	4,070	3.1	4,117	4.0	3,910	4.1	3,990
Domestic	3,953	5.1	4,295	3.6	4,010	3.6	4,053	4.3	3,860	4.2	3,935
Export	60	—14.3	75	— 8.5	60	—24.1	64	—14.7	50	....	55
Kerosine demand	314	— 5.4	195	5.4	425	4.7	312	— 0.6	463	— 0.6	444
Domestic	313	—50.0	193	5.5	420	5.3	310	— 0.3	460	— 0.9	440
Export	1	— 5.1	2	....	5	—28.6	2	—33.3	3	50.0	4
Distillate demand	2,012	3.1	1,270	4.0	2,287	2.1	1,894	2.9	2,733	2.5	2,509
Domestic	1,976	4.1	1,220	5.1	2,240	2.1	1,852	3.6	2,695	2.6	2,466
Export	36	—30.7	50	—16.7	47	4.4	42	—19.2	38	— 2.5	43
Residual demand	1,774	16.3	1,344	1.4	1,720	— 0.4	1,653	8.4	2,025	— 3.1	1,872
Domestic	1,691	15.7	1,280	3.1	1,660	0.1	1,580	8.6	1,965	— 1.6	1,812
Export	83	29.7	64	—23.8	60	—13.0	73	4.3	60	—53.3	60
Jet fuel demand	267	6.4	280	6.1	295	8.5	277	6.5	295	15.7	295
Domestic	267	6.4	280	6.5	295	8.9	277	6.9	295	16.1	295
Export	....	....	....	—100.0	....	—100.0	....	—100.0	....	—100.0	....
Lubricant demand	155	13.1	157	4.7	152	0.7	155	7.6	150	2.0	151
Domestic	115	10.6	118	6.3	115	0.9	116	7.4	115	2.7	115
Export	40	21.2	39	....	37	....	39	8.3	35	....	36
Other demand	1,277	4.6	1,501	5.7	1,367	2.9	1,356	4.5	1,317	4.5	1,342
Domestic	1,247	5.9	1,470	6.2	1,340	3.4	1,327	5.4	1,290	4.9	1,315
Crude export	7	—56.3	7	—22.2	5	—28.6	6	—50.0	7	....	6
Other export	23	—17.9	24	—10.3	22	—12.0	23	—14.8	20	—13.0	21
Stock change	54	....	478	....	—456	....	32	....	—673	....	—564
Crude	10	....	38	....	— 30	....	7	....	— 57	....	— 43
Products	44	....	440	....	—426	....	25	....	—616	....	—521
Total new supply	**9,866**	**11.1**	**9,595**	**3.6**	**9,860**	**0.9**	**9,796**	**6.5**	**10,220**	**— 0.8**	**10,039**
Imports	**1,831**	**11.9**	**1,610**	**0.2**	**1,650**	**—13.1**	**1,730**	**2.1**	**1,770**	**—20.2**	**1,710**
Crude	916	— 2.4	940	— 0.3	950	— 4.3	931	— 2.3	950	— 0.8	950
Products	915	31.1	670	0.9	700	—22.7	799	7.7	820	—34.9	760
Production	**8,035**	**10.9**	**7,985**	**4.3**	**8,210**	**4.3**	**8,066**	**7.5**	**8,450**	**4.6**	**8,329**
Crude	7,180	11.1	7,150	4.1	7,330	4.2	7,210	7.5	7,550	4.8	7,439
Gas liquids	855	9.6	835	6.1	880	5.0	856	7.4	900	2.4	890
Runs to stills	**8,036**	**7.9**	**8,000**	**3.7**	**8,250**	**5.6**	**8,081**	**6.2**	**8,495**	**2.7**	**8,372**

*First quarter actual, part of second quarter estimated, last half and first quarter 1960 forecast.



Production up, but still lags '57

THE STEPUP in crude production in the first half of 1959 created the second-largest volumetric increase on record. Total first-half crude production this year was 7,180,100 bbl. daily, a gain of 716,000 bbl. daily or 11.1% over the first 6 months' total of 6,464,100 bbl. daily in 1958. The record increase occurred in 1951 when a gain of 1,014,000 bbl. daily was reported.

The 1951 increase came after a small production cut in 1950. This year's production boost followed 1958's record drop of 1,034,200 bbl. daily. The production pickup this year was effected generally by the cutback in the spring and summer of 1958 to alleviate the high stock situation, and the revival of over-all business activity this year which created a greater demand.

Even though the increase is large, the 1959 total first-half production of 7,180,100 bbl. daily fell short of a projected 1946-1956 trend which would place production for the first 6 months of 1959 at 7,800,000 bbl. daily. The long-term trend figure for 1958 was 7,550,000 bbl. daily, 1,085,900 bbl. daily more than actual production for that period.

This year's increase represents a return of 71% of the 1958 decrease which leaves the present total 282,000 bbl. daily or 3.8% under the first-half 1957 total.

April had the largest monthly production of the first half with 7,256,000 bbl. daily, and also the greatest increase over the same month last year. This increase was 968,000 bbl. daily.

Texas provided a large portion of the total April increase with a gain of 560,334 bbl. daily.

Each of the first 6 months in 1959 averaged over 7,000,000 bbl. daily. In 1958 only January and February came close to that amount.

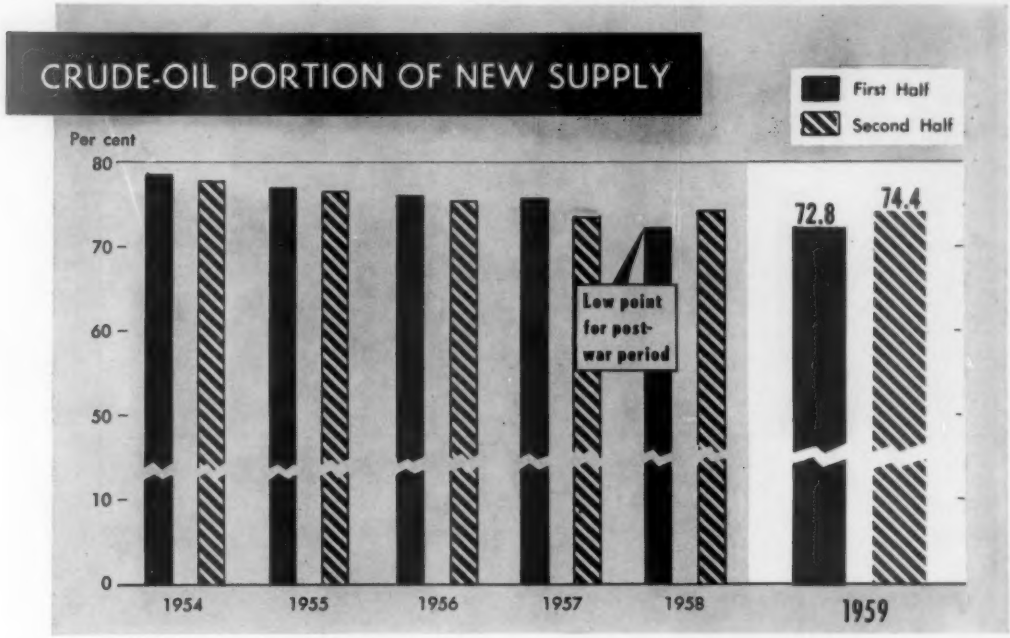
Texas absorbed 71.5% of the total decrease in 1958 and this year was responsible for 57% of the total increase. A closer look at the increases and decreases concerned in the Texas-U. S. relationship brings out the dip in the downward trend in allowable days in Texas. For the first half of 1958 there was a cut of 40 producing days for the 6-month period, a reduction of 41.7% from first half of 1957. The gain of 15 days in the first 6 months of 1959 represents a partial recouping of the 1958 loss.

As a result of the increase in allowable days, total Texas crude production was up 16.8% for the first 6 months of this year. The increase was 408,000 bbl. daily, bringing the total to 2,838,500 bbl. daily.

Three states, Texas, Louisiana, and Utah, provided 84.7% of the total U. S. first-half increase. Utah, with a 178.4% first-half gain, had the highest percentage increase and has moved up from a 1956 position of twenty-third among the producing states in daily average production to eleventh in 1959.

TEXAS ALLOWABLE DAYS

	1955	1956	1957	1958	1959	1958-59 increase
Jan.	18	17	16	12	12	0
Feb.	16	16	15	11	14	3
Mar.	18	17	18	9	12	3
Apr.	17	16	16	8	11	3
May	16	16	16	8	12	4
June	15	15	15	8	10	2
6-mo.	100	97	96	56	71	15



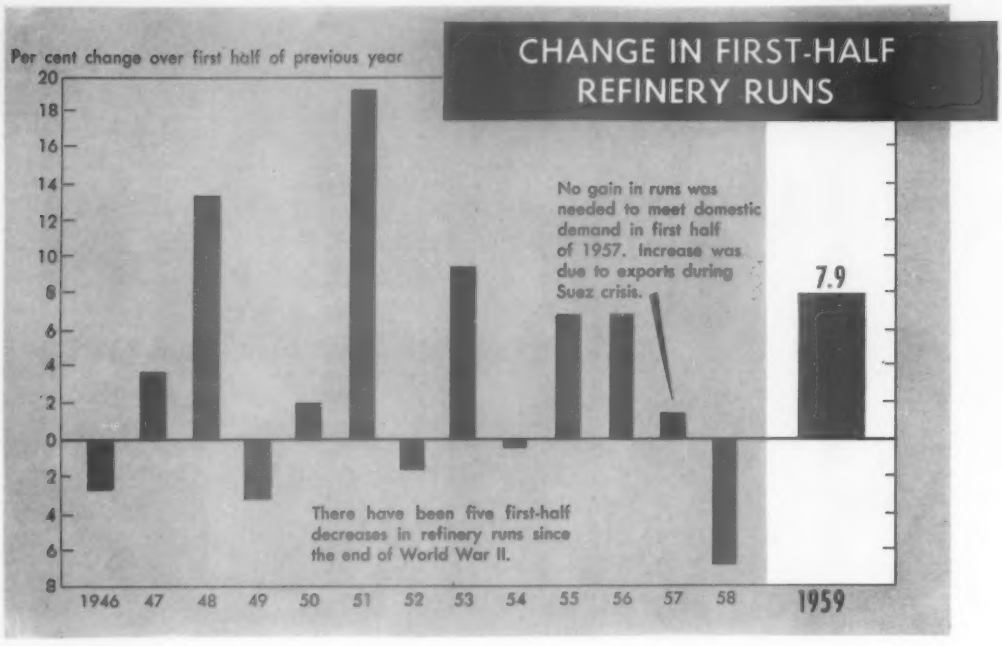
Four of the eight largest crude-producing states are still below their 1946-1956 production trends. Two of these four states, Kansas and Texas, showed recovery gains this year that were greater than average annual gains. Oklahoma had a gain but it was less than the recent average increases, and California production continued to drop, until it reached the lowest level since 1944.

Wyoming and New Mexico have followed their respective trends closely and are now slightly above trend figures. Illinois had a first-half production drop this year but continues to be over its trend figure for the fifth consecutive year. Louisiana dropped below the projected figure last year but has exceeded it by 250,000 bbl. daily this year. Kentucky gained 61.8%, mostly from areas in and near Green County.

U. S. crude-oil production, first half of year

(Thousands of barrels daily)

	1959	1958	1957	1956	1955	1954	1953	1952	1951	1950	1949	1948
Alabama	13.7	15.7	13.9	6.4	3.7	4.5	4.7	2.7	2.8	1.6	1.2	1.3
Arkansas	78.9	79.3	85.6	78.8	78.0	81.4	81.0	80.2	81.7	85.8	84.8	85.7
California	842.3	872.1	931.6	966.1	971.2	989.4	998.1	980.0	964.9	866.6	938.2	940.2
Colorado	127.2	135.4	155.2	162.3	139.2	120.8	95.3	80.8	76.7	60.3	63.7	45.7
Florida	1.2	1.2	1.3	1.3	1.3	1.5	1.5	1.7	1.6	1.1	1.3	0.8
Illinois	215.6	223.5	207.8	225.9	218.7	177.7	160.7	164.1	166.3	169.4	175.5	174.0
Indiana	32.1	32.2	35.4	29.1	29.9	31.7	35.6	31.5	28.0	28.9	24.3	17.2
Kansas	333.8	316.7	341.7	343.1	331.8	328.7	328.9	296.4	309.4	286.2	288.0	297.1
Kentucky	70.2	43.4	46.9	48.0	40.5	37.2	30.6	34.4	29.0	26.5	23.2	24.1
Louisiana	951.5	822.8	984.8	808.2	725.3	707.0	708.5	645.6	632.9	547.3	520.8	483.0
Michigan	26.2	25.5	28.3	29.6	31.6	33.5	33.9	37.1	39.3	44.7	44.6	44.9
Mississippi	124.1	97.5	112.8	111.9	98.3	95.0	99.4	99.8	102.4	101.0	108.5	120.2
Montana	80.8	76.7	56.6	56.8	43.9	37.2	30.9	23.7	24.4	21.8	25.8	24.8
Nebraska	59.0	53.1	49.9	42.1	27.5	20.4	16.2	6.2	7.6	2.3	0.6	0.6
Nevada	0.4	....	....	0.2	0.2	....	....	....	....	....	....	....
New Mexico	288.5	260.6	261.3	238.2	222.8	201.1	187.3	150.9	140.3	126.6	132.9	128.1
New York	5.4	6.2	7.4	7.5	8.1	9.1	10.7	11.7	11.6	11.5	12.3	12.7
North Dakota	44.5	40.4	38.6	35.9	27.1	14.5	14.6	1.2	....	....	....	....
Ohio	15.3	17.3	13.7	12.6	11.5	11.0	9.4	9.0	8.8	9.3	9.6	9.5
Oklahoma	560.4	548.7	610.8	600.4	545.9	532.9	558.4	507.1	504.2	417.8	419.1	411.3
Pennsylvania	16.1	19.0	23.1	22.4	23.1	26.4	29.5	31.3	31.8	31.8	32.1	34.9
Texas	2,838.5	2,430.5	3,150.8	3,041.3	2,913.8	2,725.2	2,836.3	2,722.9	2,695.3	2,034.8	2,106.8	2,427.0
Utah	109.4	39.3	10.5	5.5	6.0	5.4	5.2	4.3	3.5	3.2	0.8	....
West Virginia	5.8	6.0	5.9	6.0	6.5	8.2	7.5	7.1	7.5	7.9	7.5	7.2
Wyoming	339.1	300.5	297.9	286.1	267.1	252.5	213.5	175.4	190.2	159.8	127.1	145.9
Miscellaneous	0.1	0.5	0.4	0.3	0.3	0.4	0.2	0.2	0.2	0.2	0.3	0.2
Total U. S.	7,180.1	6,464.1	7,472.2	7,166.0	6,773.3	6,452.7	6,497.9	6,105.3	6,060.4	5,046.4	5,149.0	5,436.4


CHANGE IN FIRST-HALF REFINERY RUNS
Per cent change over first half of previous year
20
18
16
14
12
10
8
6
4
2
0
2
4
6
8
No gain in runs was needed to meet domestic demand in first half of 1957. Increase was due to exports during Suez crisis.
7.9
There have been five first-half decreases in refinery runs since the end of World War II.
1946 47 48 49 50 51 52 53 54 55 56 57 58 1959

Crude runs exceed 8 million barrels; up 7.9% in first half

REFINERS ran 7.9% more crude in the first half of 1959 than in the same period of 1958. Total demand for all oils gained only 6.1%. Since product imports were up 31.1% and gas-liquid production increased 9.6%, it is definitely clear that there has been no shortage of petroleum products so far this year.

The major complaints of the year have been that production and runs were too high; imports included some products not needed in the over-all supply-demand balance; and product tanks were too full.

The end result has been lower prices paid to refiners for the products made from crude.

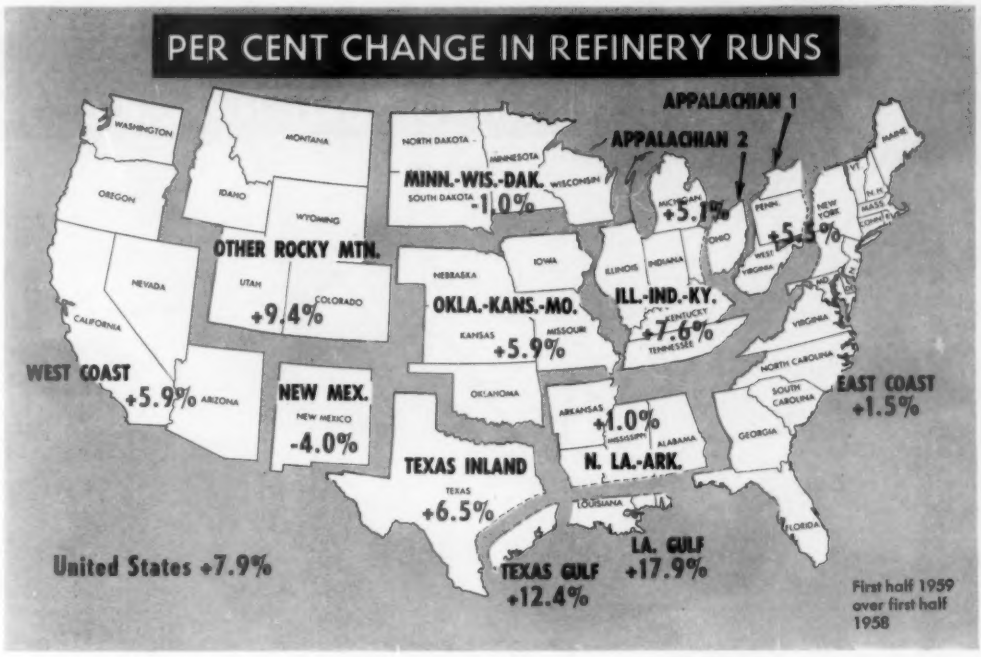
Total crude runs averaged 8,036,000 bbl. daily compared with 7,446,000 bbl. daily last year and with 8,002,000 bbl. daily for the first half of 1957. But

Refinery runs by districts—January-June

(Thousands of barrels daily)

	1959*	1958	1957	1956	1955	1954	1953	1952	1951	1950	% of total 1959	% of total 1950
East Coast	1,131	1,114	1,206	1,102	1,048	1,024	1,043	996	1,010	862	14.1	15.9
Appalachian:												
District 1	96	91	100	99	96	108	108	106	103	92	1.2	1.7
District 2	103	98	98	103	93	90	91	70	76	70	1.3	1.3
Ill., Ind., Ky.	1,481	1,376	1,396	1,393	1,353	1,288	1,246	1,158	1,195	999	18.4	18.4
Minn., Wis., Dak.	103	104	99	86	(†)	(†)	(†)	(†)	(†)	(†)	1.3	(†)
Okla., Kans., Mo.	739	698	689	686	654	591	580	502	529	459	9.2	8.5
Texas:												
Inland	279	262	269	272	253	245	264	253	238	202	3.5	3.7
Gulf Coast	1,891	1,683	1,939	1,988	1,828	1,672	1,738	1,473	1,552	1,191	23.5	22.0
La. Gulf	705	598	671	705	642	562	548	515	491	448	8.8	8.3
N. La.-Ark.	100	99	88	86	89	87	85	77	78	69	1.2	1.3
Rocky Mtn.:												
New Mexico	24	25	27	22	21	19	19	17	14	13	0.3	0.2
Other Rocky Mtn	278	254	270	265	249	237	229	211	214	173	3.4	3.2
West Coast	1,106	1,044	1,150	1,099	1,039	1,032	1,029	968	945	843	13.8	15.5
Total U. S.	8,036	7,446	8,002	7,906	7,365	6,955	6,980	6,346	6,445	5,421	100.0	100.0

*Based on 4 months Bureau of Mines and 2 months API. †Included in Illinois, Indiana, Kentucky district.



runs in the early months of 1957 included the added crude processed to meet part of the European demand during the Suez crisis, and operations in 1958 were at a low level both because stocks had to be reduced and demand was low.

The map of refining districts shows percentage gains in refinery runs over the first half of 1958. There were three areas with gains higher than the national average and another with just a little less.

Louisiana Gulf Coast had the largest gain, 17.9%, followed by Texas Gulf Coast with 17.9%, and the Rocky Mountain area with an increase of 9.4%.

The table of runs by districts makes it possible to get a better picture of the growth in refining by districts. The last two columns on the right show refinery runs by districts expressed as per cent of total runs for the country. Those districts with higher percentages of total runs in 1959 than in 1950 have grown faster than the national average.

For example, East Coast runs represented 14.1% of the total this year compared with 15.9% in 1950. So, the relative position of East Coast refining was down in 1959 compared with 1950.

Refined products . . . Operators shifted yield patterns this year. They made more distillate per barrel of crude and less residual than they did last year.

Gasoline production increased 7.6% over last year compared with 7.9% for crude runs. This means just a little less gasoline from the average barrel of crude. But distillate production was up 15.1%, almost twice the percentage gains in runs. Residual production was only 2.1% higher than last year.

Product stocks . . . Refined-product stocks drop sharply in the first quarter each year and gain in the second. Sometimes the second-quarter gains are larger than the first-quarter losses to give a net addition to product stocks for the first half. Stocks showed a net gain of 8 million barrels in the first half of this year. They dropped 38 million barrels in the first half of last year.

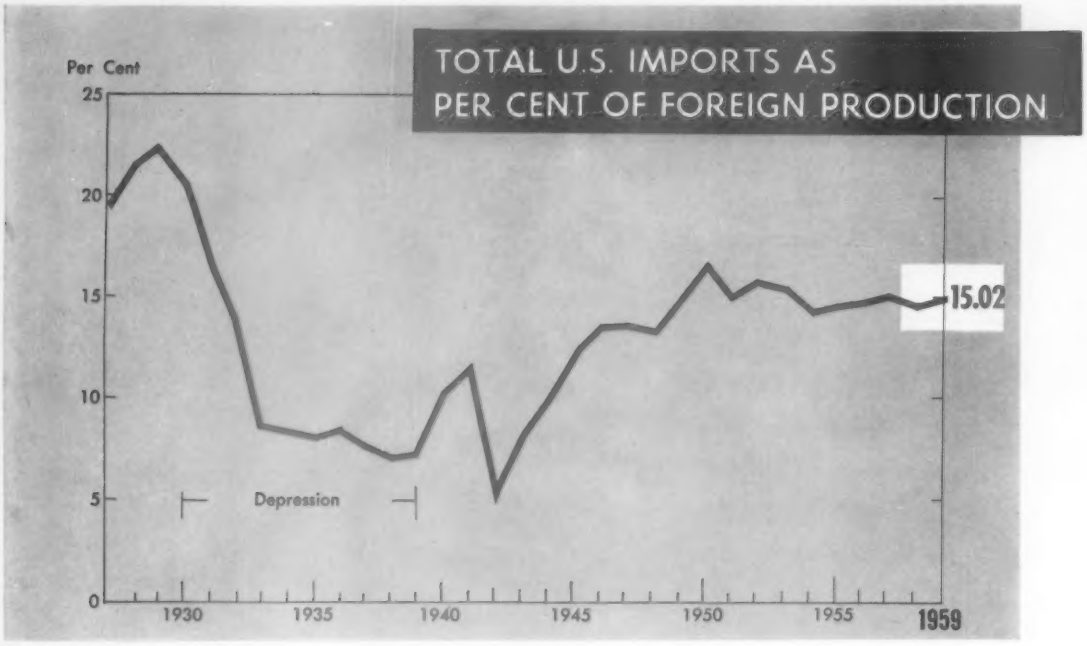
The over-all average change in product stocks for the first half since World War II has been a reduction of about 4 million barrels a season. This was an add-to-storage year.

The net addition to product storage of 44,000 bbl. daily in the first half should produce below-normal runs for the last half of the year. Since runs were as much as 100,000 bbl. daily higher than needed to meet first-half demands, an extra cut of 100,000 bbl. daily will be needed in the last half if stocks are to be down to normal levels by the end of the year.

Runs and product output

(Thousands of barrels daily)

	Runs	Gasoline	Kero-sine	Distil-late	Resid-ual
1947	5,075	2,235	303	855	1,227
1948	5,549	2,446	333	1,040	1,274
1949	5,326	2,572	280	934	1,164
1950	5,739	2,735	325	1,093	1,165
1951	6,494	3,037	372	1,304	1,286
1952	6,670	3,160	361	1,422	1,240
1953	7,000	3,381	338	1,447	1,233
1954	6,958	3,378	335	1,486	1,142
1955	7,480	3,648	321	1,651	1,152
1956					
First half	7,906	3,753	332	1,797	1,203
Last half	7,968	3,879	343	1,841	1,129
1957					
First half	8,002	3,813	310	1,889	1,188
Last half	7,837	3,942	287	1,776	1,090
1958					
First half	7,446	3,709	301	1,671	998
Last half	7,746	4,006	297	1,790	980
1959					
First half	8,036	3,991	320	1,924	1,019



Refined-products imports hit new high

CONTROL of petroleum imports into the United States shifted from a voluntary basis in the first quarter to definite quotas in the second quarter of this year.

The change did not have much effect on crude imports but it did force a reduction in receipts of finished and unfinished products.

Crude imports averages 958,000 bbl. daily in the first quarter under voluntary control compared with 959,000 bbl. daily for the same quarter last year. For the second quarter, the estimated average this year was 874,000 bbl. daily compared with 919,000 bbl. daily last year.

Imports of refined products reached an all-time high in the first quarter of this year with an average of 1,259,000 bbl. daily. The first-quarter average last year was 721,000 bbl. daily.

Quota limitations held the second quarter average to 573,000 bbl. daily compared with 675,000 bbl. daily a year ago. Total for first half was 915,000 bbl. daily.

IMPORTS INTO UNITED STATES
(Thousands of barrels daily)

	Jan.-June 1959*	Jan.-June 1958	Change	Per cent change
Crude	916.0	939.0	–23.0	– 2.4
Residual fuel	683.0	512.5	170.5	33.3
Other oils	232.0	185.6	46.4	25.0
Total	1,831.0	1,637.1	193.9	11.8

EXPORTS
(Thousands of barrels daily)

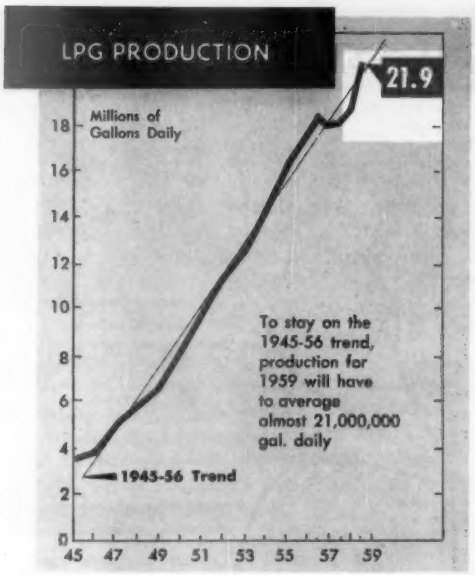
	Jan.-June 1959*	Jan.-June 1958	Change	Per cent change
Crude	6.6	15.7	– 9.1	–58.0
Gasoline	60.0	70.0	–10.0	–14.3
Kerosine	1.3	2.2	– 0.9	–40.9
Distillate fuel	35.9	52.4	–16.5	–31.5
Residual fuel	82.6	63.7	18.9	29.7
Lube oils	39.8	33.5	6.3	18.8
Other oils	23.3	27.2	–3.9	–14.3
Total	249.5	264.7	–15.2	– 5.7

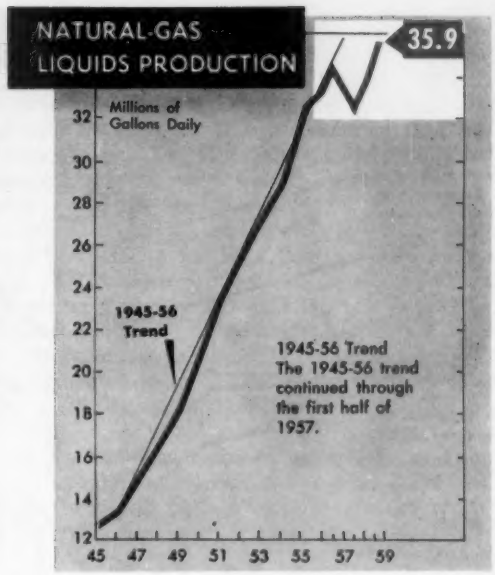
*Four months actual, two months estimated.

CRUDE IMPORTS BY COUNTRY OF ORIGIN*
(Thousands of barrels daily)

	Jan.-Apr. 1959	Jan.-Apr. 1958	Change	Per cent change
Mexico	1.0	1.9	– 0.9	–47.4
Colombia	27.6	22.2	5.4	24.3
Venezuela	409.0	428.3	–19.3	– 4.5
Peru		1.6	– 1.6	
Trinidad		1.0	– 1.0	
Brazil	1.2	2.2	– 1.0	–45.5
Latin America	438.8	457.2	–18.4	– 4.0
Kuwait	154.0	†179.9	–25.9	–14.4
Saudi Arabia	67.6	†103.3	–35.7	–34.6
Neutral Zone	34.4		34.4	
Iraq	28.8	25.3	3.5	13.8
Iran	16.5	12.6	3.9	31.0
Qatar		5.4	– 5.4	
Middle East	301.3	326.5	–25.2	– 7.7
Canada	83.5	105.3	–21.8	–20.7
Far East	80.7	45.8	34.9	76.2
Total crude	904.3	934.8	–30.5	– 3.3

*U. S. Bureau of Mines. †Includes some Neutral Zone.


LPG PRODUCTION
21.9
Millions of Gallons Daily
To stay on the 1945-56 trend, production for 1959 will have to average almost 21,000,000 gal. daily
1945-56 Trend
45 47 49 51 53 55 57 59


NATURAL-GAS LIQUIDS PRODUCTION
35.9
Millions of Gallons Daily
1945-56 Trend
1945-56 Trend The 1945-56 trend continued through the first half of 1957.
45 47 49 51 53 55 57 59

Natural-gas liquids hit a new peak

PRODUCTION at natural-gasoline and cycling plants averaged 35,856,000 gal. daily for the first 6 months of this year to set an all-time record. The previous record for a half-year period was the 34,383,000 gal. daily reported for the first half of 1957.

Total plant production for the first half represented a gain of 9.6% over the same period in 1958. Part of this increase can be credited to low production during the base period. The average for the first half of 1958 was only a little more than the average for 1955.

The above charts show that plant production of LPG is holding its position in the postwar trend. But, natural gasoline stands little chance of recovering from losses during late 1957 and early 1958.

Production at natural-gasoline and cycling plants

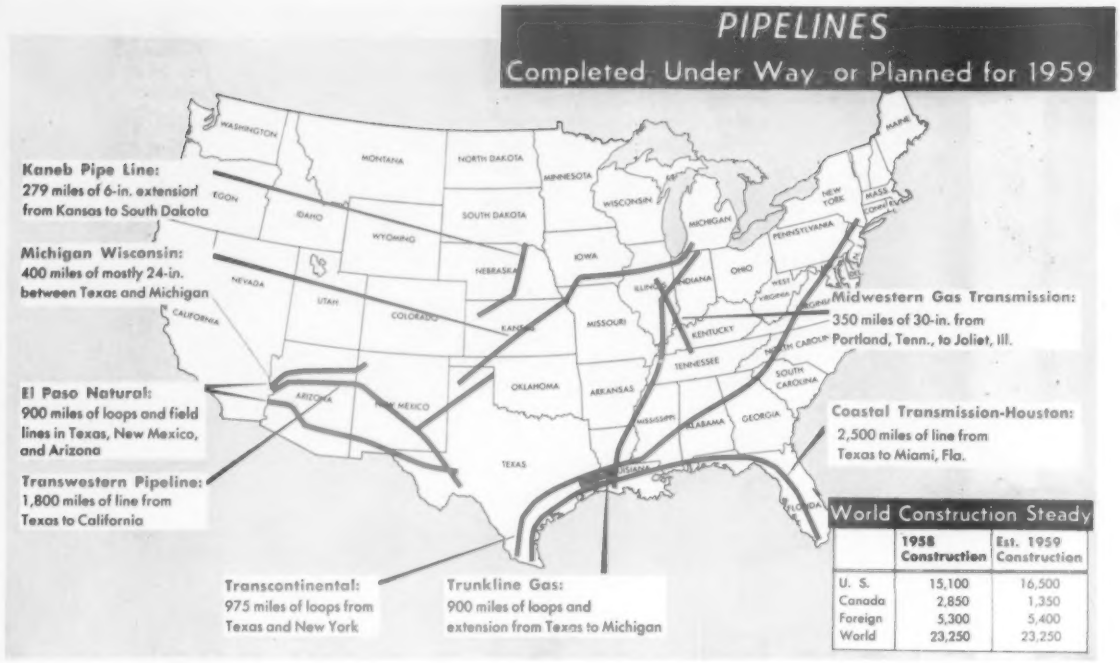
(Thousands of gallons daily)

	LPG	Natural gaso.‡	Other	Total	Increase, % Total	Increase, % LPG
1945	3,562	7,157	2,171	12,890	12.3	11.4
1946	3,763	7,472	2,083	13,318	3.3	5.7
1947	5,074	7,627	2,507	15,208	14.2	34.8
1948	5,880	8,295	2,659	16,834	10.7	15.9
1949	6,518	8,388	3,171	18,077	7.4	10.9
1950	8,198	8,963	3,780	20,941	15.8	25.8
1951	9,761	9,832	3,969	23,562	12.5	19.1
1952	11,445	10,277	3,923	25,645	8.8	17.2
1953	12,659	10,769	4,023	27,451	7.0	10.6
1954	14,259	11,248	3,507	29,014	5.7	12.6
1955	16,363	12,214	3,801	32,378	11.6	14.8
1956	17,725	12,128	3,738	33,591	3.6	8.3
1957	18,234	12,120	3,590	33,944	1.1	2.9
1958	18,439	11,595	3,370	33,404	–1.6	1.1
First half	18,152	11,017	3,552	32,721	–4.8	–1.3
Last half	18,722	12,164	3,191	34,077	1.7	3.6
1959:						
First half*	20,877	11,225	3,754	35,856	9.6	15.0
Last half†	21,500	11,000	3,500	36,000	5.6	14.8

*Four months actual, two months estimated. †Forecast. ‡Isopentane included in natural gasoline.

	1957 First half	1958 First half	1958 Last half	1959 First half*
Pennsylvania	15	9	8	9
West Virginia	770	524	557	813
Ill., Mich., Ohio	1,049	974	933	964
Kentucky	642	515	488	647
Kansas	636	672	573	673
Neb.-N. D.	209	236	249	283
Oklahoma	2,867	3,018	3,000	3,114
Texas	18,927	17,422	18,755	19,275
Gulf	4,229	4,078	4,197	4,362
East Texas	964	709	820	827
Panhandle	2,881	2,841	2,803	3,182
West Texas	6,259	5,342	6,534	6,237
Rest of state	4,594	4,452	4,401	4,667
Arkansas	255	243	256	253
Louisiana	3,083	3,164	3,311	3,548
Gulf	1,607	1,768	1,827	1,956
Inland	1,476	1,396	1,484	1,592
Mississippi	99	97	93	129
New Mexico	1,816	1,917	1,939	2,187
Colo., Mont., Utah	338	(†)	(†)	(†)
Wyoming	281	663	696	705
California	3,396	3,267	3,219	3,256
Total U. S.	34,383	32,721	34,077	35,856

*Four months actual, two months estimated. †Included with Wyoming.



World Construction Steady

	1958 Construction	Est. 1959 Construction
U. S.	15,100	16,500
Canada	2,850	1,350
Foreign	5,300	5,400
World	23,250	23,250

Pipeline construction to surpass 1958

. . . but will fall far short of record 1957

THE BIG PROJECTS were slow in clearing the Federal Power Commission, but at midyear pipeline construction had picked up rapidly and indicated a mileage total that will be well above 1958.

A survey by The Oil and Gas Journal points to a 16,500-mile year for the United States compared with 15,100 miles last year. Because of slackened crude-oil and products-line building, the total is expected to be far short of the 1957 record of 19,900 miles.

Here is the 1959 forecast, based on a survey of companies and governments throughout the world:

. . . **U. S. natural gas**—13,500 miles compared with 10,000 miles in 1958.

. . . **U. S. crude**—1,800 miles compared with 3,100 miles in 1958.

. . . **U. S. products** (including LPG)—1,200 miles compared with 2,000 miles in 1958.

. . . **Total Canada**—1,200 miles (700 natural gas, 450 crude, and 50 products) compared to 2,850 miles in 1958.

. . . **Total foreign**—5,400 miles (2,550 natural gas, 2,200 crude, and 650 products) compared to 5,300 miles in 1958.

World-wide construction continued at the same level—23,100 miles estimated for 1959 compared to 23,250 miles in 1958.

Increased construction in the United States was reflected in sharply increased line-pipe shipments. Shipments the first 4 months of the year were almost as great as shipments for the first 6 months in 1958.

U. S. natural-gas lines

The dominance of natural-gas lines in the U. S. construction picture is more apparent than ever. Natural-gas lines amount to more than 80% of U. S. mileage this year and an even larger share of steel tonnage consumed.

Part of the credit for this year's faster construction pace must be assigned to the Supreme Court's reversal of the Memphis decision last December. Now that pipelines are again free to plan projects without the requirement for advance customer approval of rates, construction has opened up once more.

Several major projects were getting under way, or preparing to start, at midyear. The most important, involving 1,809 miles of pipe, is Transwestern Pipeline, which received an FPC examiner's approval on July 1 and has been awaiting final FPC action on its Texas-California project.

El Paso Natural Gas Co. expects to lay more than 900 miles of gas line this year; 555 miles will be laid during the last half of the year.

Another 900 miles will be laid by Trunkline Gas Co., which is just starting its first major expansion. It

includes looping between Texas and Tuscola, Ill., and a 200-mile extension from Tuscola to the Michigan border.

Transcontinental Gas Pipe Line Corp. plans to construct 975 miles of line, including 675 miles during the last half of the year on its major looping program. Midwestern Gas Transmission Co., the Tennessee Gas affiliate, finally got its 350-mile 30-in. line through FPC and started construction between Portland, Tenn., and Joliet, Ill. And Tennessee will lay an additional 200 miles.

Michigan Wisconsin Pipe Line Co. has completed almost 400 miles of 24-in. loops between Oklahoma and Michigan. United Gas Pipe Line Co. plans almost 400 miles between southeast Louisiana and Alabama. Northern Natural Gas Co. plans several hundred miles in an application which should be decided during the summer.

Houston Texas Gas & Oil Corp. and Coastal Transmission Corp. completed their 2,500-mile system from McAllen, Tex., on the Mexican border, to Miami, Fla. Another new area received gas service with the completion of North Carolina Natural Gas Corp.'s 700-mile line.

U.S. crude and product lines

Oversupply problems have caused postponement of some oil lines which will have to be built later. As a result, construction has slumped to about 50% of what might be expected to be normal.

No major new crude lines have been started this year, and no big looping of an existing system has been announced. Construction has been confined to minor modernization and short extensions to new fields.

Products-line activity has slowed, too. The longest line announced is the 279-mile 6-in. extension of Kaneb Pipe Line in Nebraska and South Dakota. Great Lakes plans 126 miles of 12-in. into Chicago. Continental Pipe Line Co. will build a 155-mile 6-in. line from Artesia, N. M., to El Paso, Tex. Buckeye Pipe Line will lay some 130 miles of line during the year in Michigan.

Canadian lines

This is definitely not Canada's year. After enjoying several years of boom, a slump has set in. Gas lines are awaiting Canadian and U. S. regulatory approval for projects to serve the West Coast and the Midwest. Crude lines are suffering from the oversupply of crude which leaves them with plenty of spare capacity.

About the only gas-line building under way is being done by Alberta Gas Trunk Line, some 250 miles to increase the supply for Trans-Canada Pipe Lines; Saskatchewan Power Corp., some 300 miles; and Canadian Western Natural Gas, 80 miles.

Crude-line building is at a standstill. The only immediate projects in sight are a line to take production of new northeastern British Columbia fields to the Dawson Creek and Fort St. John refineries and also into Alberta to connect with the Trans Mountain system, and a line from Cessford to Calgary.

Next year should see a pickup in gas-line construction. The Alberta-San Francisco line proposed by Pacific Gas & Electric Co. and a major expansion of Westcoast Transmission Co., Ltd., now pending before regulatory bodies, may get under way.

The ambitious crude projects are less certain. The big Edmonton-Montreal line seems to be shelved unless the world supply situation is altered, the price pattern is changed, or the Canadian Government decides to back the line as a matter of national policy.

The sulfur and products line from Alberta to the West Coast and from Alberta to the Great Lakes is a possibility next year.

Foreign lines

There is little products-line activity abroad, but gas lines and crude lines are being built all over the world, causing American contractors to look abroad for business. Quiet areas are being offset by construction in countries with new discoveries.

Venezuela usually builds a few hundred miles of line each year, but short lines in the Lake Maracaibo area comprise the bulk of construction this year. Offsetting the Venezuelan slump are new crude lines and loops in Iraq, Iran, Saudi Arabia, and Kuwait.

North Africa's Algerian discoveries have led to construction of two major lines from the Sahara to the Mediterranean. One is nearly complete and another is starting. The growth in Western Europe demand, and consequent refinery expansion, are stimulating crude-line construction there.

The largest projects in the free world, outside the United States, are in Argentina. Construction continued this year on the 1,015-mile 24-in. gas line from Campo Duran to Buenos Aires, and an 815-mile 12-in. products line is being built from Campo Duran to San Lorenzo.

Major gas lines are under way in Mexico and France. Petroleos Mexicanos is building a 490-mile line from Jose Colomo field to Mexico City and Gaz de France is building a 500-mile 16 and 24-in. line from Lacq field to Paris.

Russia is engaged in several thousand miles of pipeline construction, according to the Soviet Government. Announced projects include the 2,315-mile Trans-Siberian crude and products line, a 600-mile crude line to Czechoslovakia, a 2,500-mile crude line from Volga-Ural fields to satellite countries, and several thousand miles of gas lines.

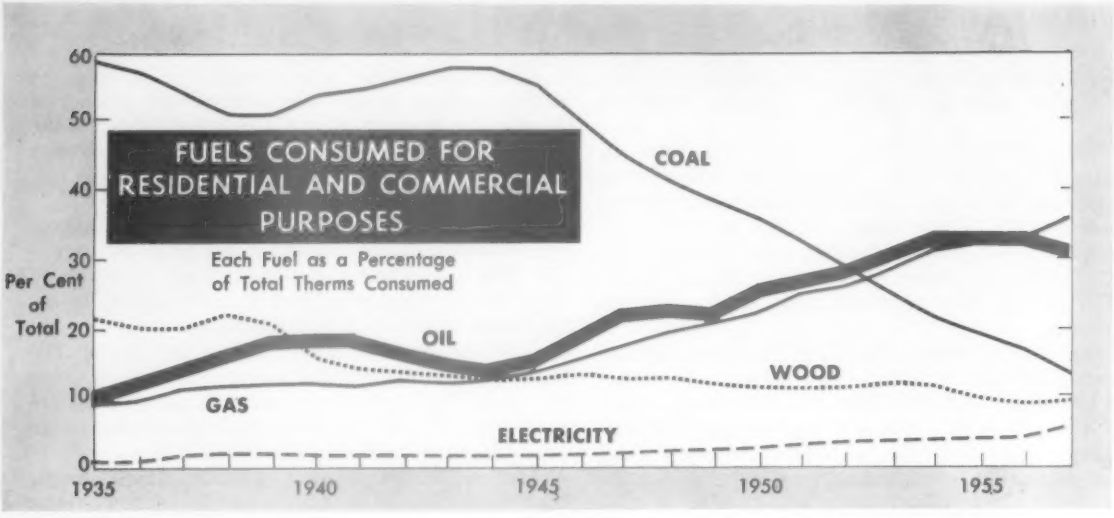


Fig. 1.

Battle of the fuels – who's winning?

BY C. E. SKINNER
Gulf Oil Corp.

VAST CHANGES have taken place since 1951 in the battle for a dominant share of the energy required to keep the American homeowner alternately warm and cool, to preserve his food and cook his meals, provide him with hot water, wash and dry his laundry, and illuminate his house. His aggregate fuel bill for these services last year was 12 billion dollars.

The substance of the material is presented in Fig. 1 and Table 1. While the data go back to 1935, it is the period following the war which is most interesting and most ominous to the home-heating branch of the oil industry.

It will be noted from the chart and table that in 1946, coal (bituminous, lignite, anthracite, coke, briquets, and packaged-coal fuels) had 50.1% of the total residential-commercial market. Thereafter it began a precipitous descent and by 1957 had dropped to 13.7% of the total B.t.u.'s consumed.

In the meantime, oil, with 19.1% of the market in 1946, rose steadily but at a slowly declining rate,

The author tells how this fuels scoreboard was prepared

C. E. SKINNER

BACK IN JANUARY 1953 the U. S. Bureau of Mines released a study which could easily become one of its most important statistical contributions to the fuels industries. This report, which now probably is lost in thousands of company files, is known as Information Circular No. 7657. Its title: "Fuels Consumed for Residential and Commercial Space Heating 1935-1951." The study was painstaking and thorough and if it had a fault it was that it was published about 3 years too soon.

The project involved lifting from numerous and scattered government and industry reports the quantities of fuels used in residences and commercial establishments and reducing their volumes to the common denominator of B.t.u.'s. This established a scoring system for competitive fuels in a single market and eliminated dependence on total energy comparisons which invariably include industrial fuel, feed stocks, and various uses not of interest to home-heating marketers. Obviously this method of measuring competition in a specialized field is of vital interest to the oil, gas, coal, and electrical industries and the myriad allied enterprises which endeavor to provide the comfort and convenience sought by the American householder. Data were gathered and processed for each year from 1935 through 1951. Unfortunately, budgetary reasons have prevented the Bureau of Mines from issuing a later edition but with its cooperation we have been able to follow their methods and update the report through 1957.

C. E. (Scotty) Skinner organized and headed Gulf Oil Corp.'s first sales-analysis unit. In 1955 he undertook the job of analyzing Gulf's foreign marketing operations in Europe and South America. In 1957 he was appointed marketing economist in Gulf's planning and economics department and recently has moved to New York where he is a member of the company's executive staff in Canada House. Scotty was one of the founders of the API Marketing Research Committee.

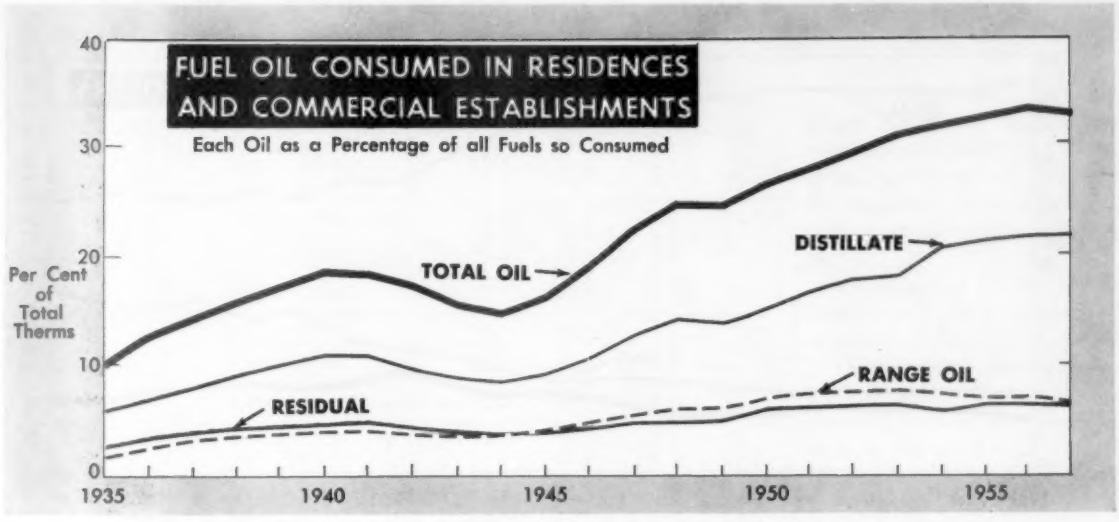


Fig. 2.

until it reached a peak of 33.3% in 1956. It began leveling its rate of climb about 1953, however, and in 1957 suffered its first setback, dropping 0.3 of a percentage point to 33.0%.

Gas—natural, manufactured, and LPG—moved into the postwar era with a 15.4% position. In 1957 its score read a loud, clear 37.8%. While the oil-heating industry began looking over its shoulder in the early 1950's, gas caught up with it in 1955 and since then has been pulling away.

Electricity's big push . . . While gas and oil were thumping coal, and from time to time each other, electricity, which previously had been content to light the American home, do most of the refrigerating, some of the cooking, a little of the water heating, and power many small-horsepower motors, now joined the battle as a prime energy supplier. It made deep inroads in the kitchen-range field where gas, kerosine, and even coal and wood held sway. It found a perfect market in the air-conditioning field, one which promises to shift its heavy load factor from winter to summer. It has spent much money on research and only the most unreconstructed oil or gas protagonist will deny the possibility that it may find an economical way of heating homes electrically and thus take on new muscle in the struggle for the home owner's energy dollar. In 1946, 1.9% of residential energy was supplied by electric current. By 1957 this had jumped to 5.7%.

Fig. 1 brings out an interesting but little known fact about the use of wood, including mill waste, as a fuel. Admittedly, the figures are estimates, furnished the Bureau of Mines by the Forest Service of the Department of Agriculture, but they are well verified by the 1950 housing census which showed that about 10% of the nation's homes in that year used wood as a prime heating and cooking fuel. Wood's percentage of the market is dropping, of course, but very slowly.

Distillate shows gain . . . There is a bright spot as far as oil is concerned. If one breaks down oil usage into its three components—distillate fuel oil, range oil, and residual—it is evident that in the basic oil heating field there is still some progress being shown. Furnace oils in Grades 1 to 4 showed an increase in market share in 1957 over 1956. However, there was a sharp decline in the range-oil group and a small decline in residual oil, causing the drop in oil's total market share from 33.3% in 1956 to 33.0% in 1957. Fig. 2 shows past and present positions of each of these petroleum fuels related to total residential and commercial energy consumption. The corresponding figures are included in Table 1.

The virtue of this approach to the score-keeping problem lies not only in the fact that it reduces all fuels to a common basis permitting ready comparison, but that it also gives weight and meaning to current statistics covering sales of fuel-consuming equipment and appliances. These statistics are legion and essential but it is impossible to assemble them in a manner which allows evaluation of their collective impact. Comprehensive data are available on the sale of oil, gas, and coal heating systems. These figures probably could be evaluated within reasonable limits, but the millions of oil, gas, coal, and electric space heaters, stoves, refrigerators, water heaters, washing machines, dryers, etc. sold each year also add materially to energy consumption and effect substantial changes in the market participation of the major competing fuels. Unfortunately, we do not know how many such units of each fuel type sold represent a net increase in the total number in use and consequently cannot determine how much they add to the demand and market position of each fuel. Moreover, if we had this fact, the problem of estimating the consumption of each unit would be practically insoluble. The method developed by the Bureau of Mines, however, evaluates all equipment and appliances which go into and out of residential and commercial service simply by measuring fuel consumption. Their answers are of paramount importance to all fuel and equipment producers, transporters, and marketers who have a stake in competition for the heat business.

This article is not concerned with forecasting the

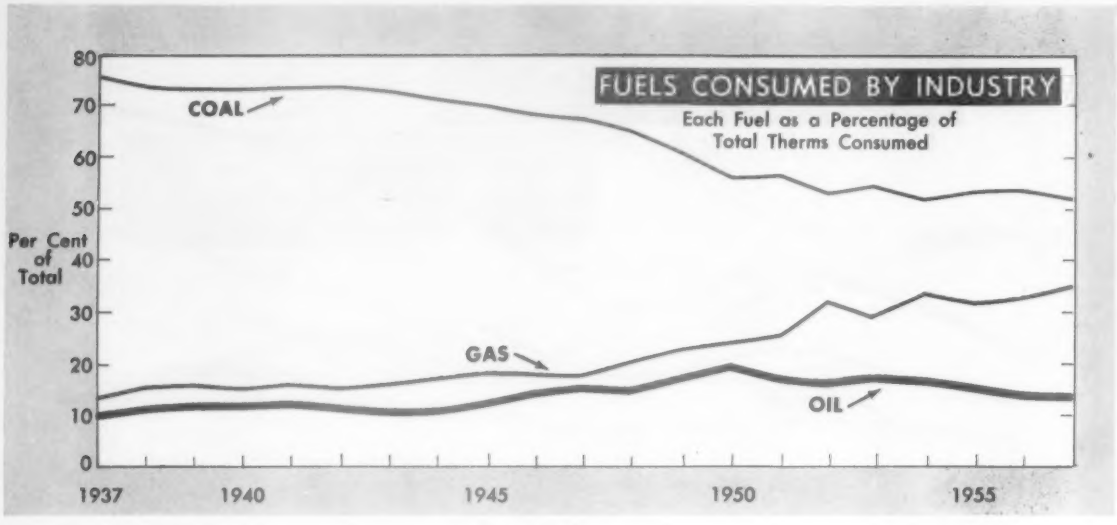


Fig. 3.

future of any fuel. Its prime purpose is to offer the fuels industries and allied enterprises a solid factual basis for forming their own conclusions about the years ahead. Nevertheless, since two of the major competitors in the field (gas and electricity) have publicized forecasts of their own demand over the next 10 years, it is of more than passing interest to quote them and to see what would remain for the other fuels, if the estimates prove to be within reason.

Good 11-year gain . . . Assuming a population in 1968 of 205,800,000 (Bureau of Census estimate) and a per capita demand for residential-commercial energy of 566 therms (about 10% more per person than in 1957), the total therms required in 1968 would be 116,483 million. This, incidentally, would be a 23% increase over 1957. The American Gas Association estimates the residential-commercial demand for gas in 1968 at the equivalent of 64,770 million therms and the Edison Electric Institute feels their demand in the same year will be the equivalent of 14,126 million therms. Should these forecasts be realized gas would have 55.6% of the total U. S. residential-commercial energy demand and electricity 12.1%. The two com-

Table 1—Fuels consumed for all residential purposes

	Oil				Gas			
	Distillate (Grades 1, 2, 3, and 4)	Range oil (kerosine and No. 1 fuel oil)	Residual (Grades 5 and 6)	Total oil	Natural gas	Manufactured gas	LPG	Total gas
1935	5.2	2.0	2.4	9.6	6.1	3.3	0	9.4
1936	6.5	2.5	2.9	11.9	6.5	3.2	0.1	9.8
1937	7.6	2.9	3.6	14.1	7.1	3.1	0.1	10.3
1938	8.2	3.3	3.9	15.4	7.6	3.3	0.1	11.0
1939	9.1	3.4	4.0	16.5	7.7	3.2	0.1	11.0
1940	10.1	3.8	4.3	18.2	7.9	3.3	0.2	11.4
1941	10.1	3.8	4.2	18.1	7.7	3.1	0.3	11.1
1942	9.6	3.5	4.1	17.2	8.6	3.1	0.4	12.1
1943	8.4	3.2	3.5	15.1	8.7	3.0	0.4	12.1
1944	8.1	3.4	3.2	14.7	8.9	3.1	0.5	12.5
1945	8.9	3.7	3.5	16.1	9.6	3.3	0.6	13.5
1946	10.6	4.4	4.1	19.1	10.7	3.7	1.0	15.4
1947	12.8	5.2	4.4	22.4	12.4	3.9	1.3	17.6
1948	14.0	5.7	4.5	24.2	14.1	3.6	1.7	19.4
1949	13.6	5.5	4.7	23.8	15.7	3.5	1.9	21.1
1950	14.7	6.2	5.3	26.2	17.2	3.3	2.2	22.7
1951	16.2	6.6	5.4	28.2	20.2	3.0	2.3	25.5
1952	17.3	6.6	5.6	29.5	22.1	3.0	2.4	27.5
1953	17.9	6.5	6.0	30.4	23.7	2.9	2.7	29.3
1954	20.1	6.5	5.6	32.2	25.8	3.1	2.8	31.7
1955	20.9	6.1	5.8	32.8	27.2	3.0	2.8	33.0
1956	21.5	6.1	5.7	33.3	29.4	2.7	2.9	35.0
1957	22.1	5.5	5.4	33.0	32.6	2.1	3.1	37.8

Sources: 1935 to 1951, incl.—B.M. Inf. Circ. 7657 "Fuels Consumed for Residential and Commercial Space Heating 1935-51."

TABLE 2—CONSUMPTION OF FUELS IN INDUSTRIES WHERE OIL, GAS AND COAL COMPETE
(Percentage of total therms)

	Oil					Coal		
	Residual	Distillate	Total oil	LPG	Total gas	Bituminous and lignite	Anthracite	Total coal
1937	9.3	1.0	10.3	0.01	13.9	73.0	2.7	75.7
1938	9.7	1.1	10.8	0.01	15.3	70.5	3.3	73.8
1939	9.8	1.5	11.3	0.01	15.2	70.2	3.2	73.4
1940	9.7	1.5	11.2	0.01	15.0	70.5	3.2	73.7
1941	9.7	1.7	11.4	0.01	15.1	70.1	3.3	73.4
1942	9.2	1.9	11.1	0.01	15.0	70.3	3.5	73.8
1943	8.6	1.7	10.3	0.02	16.1	70.0	3.4	73.4
1944	9.0	1.8	10.8	0.02	17.7	67.6	3.7	71.3
1945	9.7	2.0	11.7	0.02	18.3	66.3	3.5	69.8
1946	11.6	2.5	14.1	0.02	18.1	63.8	3.8	67.6
1947	12.2	2.7	14.9	0.02	17.6	64.0	3.3	67.3
1948	11.9	3.0	14.9	0.02	19.8	61.8	3.3	65.1
1949	14.6	2.9	17.5	0.02	22.6	57.2	2.5	59.7
1950	15.7	3.5	19.2	0.02	24.4	53.7	2.5	56.2
1951	13.8	3.4	17.2	0.02	25.6	55.0	2.0	57.0
1952	13.3	3.2	16.5	0.03	30.5	50.3	2.4	52.7
1953	14.2	3.1	17.3	0.03	29.1	51.2	2.1	53.3
1954	13.5	3.0	16.5	0.03	32.2	48.6	2.4	51.0
1955	13.0	2.8	15.8	0.04	30.7	51.3	1.8	53.1
1956	12.3	2.6	14.9	0.05	31.0	51.6	2.0	53.6
1957	11.8	2.5	14.3	0.05	32.9	50.5	1.8	52.3

Note: Above based on volumes of fuels used by those industries where oil, gas, and coal all are physically able to compete. Excludes oil and coal used by railroads and vessels since gas is not in competition in those fields. Also excludes feed stocks for chemicals and synthetic rubber manufacturing, coking coal, oil refinery fuel and oil-field use.

The American homeowner spent 12 billion dollars last year to heat, cool, and illuminate his house, to preserve his food and cook his meals, and to provide him with hot water.

Oil supplied 19.1% of this market in 1946 and reached a peak of 33.3% in 1956.

Gas started the postwar period with 15.4% of the market; passed oil in 1955; and is still climbing.

Electricity moved from 1.9% of the total in 1946 to 5.7% in 1957.

bined would then have 67.7% of the market leaving 32.3% for oil, coal, and all other fuels compared with their 56.5% share in 1957. If these forecasts become plans and the plans are realized, or substantially realized, painful adjustments will be required on the part of oil and coal.

The Industrial Market

The industrial market for fuels, being vastly different in nature from the residential-commercial market, requires special treatment and assembly of available consumption data to develop and measure the true competitive positions of the major energy sources.

and for commercial space heating—Percentage of total therms

Coal					Miscellaneous		Electricity			
Bituminous and lignite	Anthracite	Coke	Briquets and pkgd. fuels	Total coal	Petroleum coke	Wood incl. mill waste	Produced from fuel	From hydro plants	Total electricity	Grand total
36.6	17.8	4.1	0.3	58.8	0.4	20.9	0.5	0.4	0.9	100.0
35.1	17.4	4.1	0.4	57.0	0.4	20.0	0.6	0.3	0.9	100.0
33.7	16.5	3.4	0.4	54.0	0.3	20.2	0.7	0.4	1.1	100.0
30.8	16.0	3.2	0.4	50.4	0.4	21.6	0.7	0.5	1.2	100.0
30.3	16.6	3.2	0.4	50.5	0.4	20.3	0.8	0.5	1.3	100.0
34.6	15.1	3.2	0.5	53.4	0.4	15.3	0.9	0.4	1.3	100.0
36.6	15.1	2.5	0.5	54.7	0.3	14.5	0.9	0.4	1.3	100.0
37.3	15.3	2.1	0.6	55.3	0.2	13.8	0.9	0.5	1.4	100.0
41.4	14.4	1.6	0.7	58.1	0.2	13.1	0.9	0.5	1.4	100.0
41.0	14.5	2.2	0.7	58.4	0.2	12.7	1.0	0.5	1.5	100.0
40.2	12.5	2.2	0.8	55.7	0.3	12.8	1.0	0.6	1.6	100.0
34.3	13.2	1.7	0.9	50.1	0.3	13.2	1.2	0.7	1.9	100.0
32.0	10.9	1.3	0.9	45.1	0.3	12.5	1.4	0.7	2.1	100.0
28.3	11.2	1.1	0.9	41.5	0.3	12.2	1.7	0.7	2.4	100.0
29.1	8.8	0.9	0.6	39.4	0.4	12.5	1.9	0.9	2.8	100.0
26.0	8.6	0.8	0.7	36.1	0.4	11.7	2.1	0.8	2.9	100.0
22.4	7.9	0.7	0.7	31.7	0.4	10.9	2.4	0.9	3.3	100.0
20.2	6.9	0.6	0.5	28.2	0.4	10.7	2.7	1.0	3.7	100.0
18.5	5.3	0.5	0.4	24.7	0.5	10.9	3.2	1.0	4.2	100.0
15.6	4.6	0.4	0.4	21.0	0.4	10.2	3.5	1.0	4.5	100.0
14.9	3.8	0.3	0.4	19.4	0.4	9.6	3.8	1.0	4.8	100.0
13.2	3.4	0.2	0.3	17.1	0.3	9.3	4.0	1.0	5.0	100.0
10.0	3.2	0.2	0.3	13.7	0.3	9.5	4.5	1.2	5.7	100.0

1952 to 1956 incl.—Supplementary data furnished in worksheet form by Bureau of Mines. 1957—Gulf Oil Planning and Economics following procedure used by Bureau of Mines.

If one were to take the quantities of all fuels not consumed in the residential-commercial field and consider these remaining quantities to be used by industry, it would perhaps result in an interesting comparison of balances but certainly would not provide a measure of the growth, decline, or current market participation in the fields where these three major fuels are in direct competition with each other.

Noncompetitive market areas . . . Oil, coal, and gas each has important applications where one or both of of the other two fuels cannot compete and which, by the nature of the fuels or their uses, are practically captive markets. For example, neither oil nor gas can substitute for coke used in blast furnaces but coking coal averages about 28% of total coal consumption. Gas cannot compete with oil and coal in the railroad and vessel-bunkering fields. As a matter of fact, oil's physical advantages as railroad and vessel fuel, and its growth in this field, indicates that coal can no longer be considered a competitor in this market. Neither oil nor coal competes directly with gas as chemical feed stock where gas is readily available. In field and refinery uses of oil and gas, coal cannot compete. Only about 75% of total marketable gas reaches homes and industries and becomes a competitor of oil and coal. Accordingly, the true competitive situation among the three major fuels can only be determined by removing from the total consumption of each fuel those uses which are exclusive to any one or to any two of them. The net result is that the remaining volumes largely represent fuel used in stationary power installations by industrial plants and utilities where all three fuels have a chance at the business. This is the real battleground.

Table 2 and Fig. 3 show what has happened since 1937 to the competing fuels in their share of the industrial market. The chart shows the long steady fall of coal beginning during World War II. In 1937 bituminous and anthracite combined enjoyed 75.7% of the total competitive industrial market. It held at this approximate level until 1944 and then began a descent to its present 52.3% position.

It is important to note, however, that in the past 6 years there has been little or no change in coal's market participation. Only random fluctuations appear during this period. Gas made little headway in the industrial field between 1937 and 1944 and its real growth did not begin until after World War II. In 1937 it had 13.9% of the industrial market and as late as 1947 had only 17.6%. Beginning in 1948, however, its ascendancy was swift and steady and it continues to grow but its 32.9% of the 1957 market is a long way from challenging coal for leadership.

Coal's loss of industrial market has been to gas, not to oil.

Oil is running a poor third as a source of competitive industrial energy.

Where oil competes with gas, it is supplying less than half the energy from gas.

Oil is supplying only slightly more than a quarter of the competitive industrial B.t.u.'s generated from coal.

Oil's standing in industrial market . . . As a source of industrial energy oil is a poor third supplying less than half the competitive industrial B.t.u.'s now furnished by gas and slightly more than a quarter of those generated from coal. Furthermore, oil doesn't seem to be going anywhere. It reached its peak of 19.2% of the total industrial market in 1950 but in 1957 had only 14.3%. This was less than its 14.9% share back in 1947.

Between 1947 and 1957 coal dropped exactly 15.0 points of its market participation—from 67.3 to 52.3%. Gas picked up 15.3 points—from 17.6 to 32.9% while oil was losing 0.6 points. Thus we see that all of coal's industrial loss has been to gas—not to oil.

Oil itself has lost heavily to gas. Its peak of 19.2% in 1950, largely the result of a long strike of coal miners, versus its 14.3% in 1957 represents a drop of 4.9 percentage points of market position. During this period coal dropped only 3.9 points but in the same period gas picked up 8.5 points. This was the total loss of oil and coal less a small increase by LPG. Percentagewise oil's loss in market participation was far greater than coal's, 25% to 7%. If we drop back to 1949 to eliminate the 1950 coal strike as a factor then oil's loss in market participation was 18% and coal's 12%.

If, then for the moment, we concede that gas, a relatively new and lusty competitor with certain natural and geographical advantages, will inevitably take a sizable piece of the competitive industrial market and that the real conflict is between oil and coal, the scoreboard for these two becomes an essential base for judging their respective futures. To determine how they have fared against each other we have divided the therms generated by each of these two fuels by the total therms they both generated, as if no other competitive fuel existed. The results, tabulated in Table 3, show that coal in 1957 enjoyed the highest share of this two-fuel market since 1948. It's 1957 share was 78.4% against 81.4% in 1948 and 77.4% in 1949. Oil's 1957 share was 21.6% against 18.6% in 1948 and 22.6% in 1949.

During this entire period the annual fluctuations were quite small but the significant point is that coal has experienced a steady yearly rise in market share since 1953 and oil a corresponding drop.

TABLE 3—OIL VS. COAL—EACH FUEL'S PERCENTAGE OF THE INDUSTRIAL MARKET THEY SHARE

	Oil	Coal		Oil	Coal
1937	12.0	88.0	1948	18.6	81.4
1938	12.8	87.2	1949	22.6	77.4
1939	13.3	86.7			
1940	13.2	86.8	1950	25.5	74.5
			1951	23.1	76.9
1941	13.4	86.6	1952	23.8	76.2
1942	13.1	86.9	1953	24.6	75.4
1943	12.3	87.7	1954	24.4	75.6
1944	13.2	86.8			
			1955	22.9	77.1
1945	14.4	85.6	1956	21.8	78.2
1946	17.3	82.7	1957	21.6	78.4
1947	18.1	81.9			

PLANT CONSTRUCTION

• REFINING • PETROCHEMICAL • FIELD PROCESSING

• Refiners are busy building alkylation units, while in petrochemical construction, the accent is still on polyethylene and polypropylene. Field processors are adding at least 1,800,000 M.c.f. daily capacity.

THE EMPHASIS in refinery construction this year is on alkylation, with at least 14 new units under way or planned in the U. S. and Canada.

This is a continuation of a recent trend which reflects wider use of alkylate in motor fuel. Alkylate was formerly used almost exclusively in aviation gasoline but is now an important component in motor fuels.

The Journal's midyear plant-construction report shows about 50 refinery projects under way or planned. These projects include a dozen new plants being built or considered.

New refineries currently under way include BP Canada's 25,000-bbl. plant at Ville d'Anjou, Que.; Irving Refining's 38,000-bbl. plant at St. Johns, N. B.; and Shell Oil Co. of Canada's 20,000-bbl. plant near Toronto.

Field Processing

At least 15 new field-processing plants are under construction or planned in the U. S. and Canada.

These plants, plus current expansion projects, will boost natural-gas throughput capacity by at least 1,790,000 M.c.f. daily.

Among the bigger projects is Texas Natural Gas Corp.'s plant at Rayne, La., on Columbia Gulf Transmission Co.'s natural-gas line, which will have daily capacity of 700,000 M.c.f.

Others include Humble Oil & Refining Co.'s natural-gasoline and cycling plant in Kleberg County, Texas, with capacity of 200,000 M.c.f. daily, and El Paso Natural Gas Co.'s 150,000 M.c.f. plant in Aneth field, Utah.

Petrochemicals

The Journal's midyear survey shows at least 53 new petrochemical construction projects under way or planned in the two countries.

The emphasis is still on new facilities for manufacture of polyethlene and polypropylene.

Among the big projects is Magnolia Petroleum Co.'s $25-million project for production of ethylene, propylene, and butadiene at Beaumont, Tex.

Another significant development is Sohio Chemical Co.'s proposed plant at Lima, Ohio, where a new simple single-step conversion process will be used to make acrylonitrile.

The construction report also indicates that so-called man-made natural rubber, such as the polybutadiene and polyisoprene types, is beginning gradually to move out of the pilot stage into the commercial field.

Refineries

A

• **American Gilsonite Co.** plans to expand coking unit from 700 tons per day to 1,100 tons at Grand Junction, Colo. **Foster Wheeler Corp.** has engineering contract.

• **Atlantic Refining Co.** will increase fresh-feed capacity 3,200 bbl. daily and recycle 1,900 bbl. daily on the fluid cat cracker at Philadelphia. Completion is scheduled by 1960.

• **Aurora Gasoline Co.** will add a sulfuric acid alkylation unit with 2,000-bbl. initial capacity and ultimate capacity of 3,600 bbl. at Detroit, with completion set for October 1959. **Refinery Engineering Co.** is contractor for this project as well as an 8,000-bbl. naphtha Unifining unit.

B

• **Bay Petroleum Corp.** will increase crude capacity from 24,000 bbl. to 34,000 bbl. daily at Chalmette, La., by April 1, 1960. Contractor is **Bechtel Corp.**

• **British American Oil Co., Ltd.,** will add a new alkylation unit at its Clarkson, Ont., refinery by the spring of 1960. A compounding, blending, and grease plant is scheduled for completion by the fourth quarter of 1959. **Foster Wheeler, Ltd.,** has contract.

At Calgary, capacity of the cat reformer is being increased from 2,000 to 3,000 bbl. daily. Completion date is November 1959, and **Refinery Engineering Co.** has the contract.

• **BP Canada, Ltd.,** will complete a $30,000,000, 25,000-bbl. plant at Ville d'Anjou, Que., by April 1960. **Lummus Co. of Canada, Ltd.,** has contract for the program which includes a 15,000-bbl. vacuum unit charging topped crude, a 9,000-bbl. cat cracker, a 6,000-bbl. Platformer, a 12,000-bbl. hydrodesulfurization unit, and an 800-bbl. catalytic polymerization unit.

C

• **Carter Oil Co.** is building an asphalt emulsification unit and revamping the road-oil plant at its Billings, Mont., refinery. The new asphalt plant will have a capacity of about 7,000 gal. per hour when completed during the third quarter of 1959. **Refinery Engineering Co.** has the contract.

• **Coastal Products Co.** will complete a 7,000-bbl. delayed coker at Corpus Christi during the first quarter 1960. Contractor for the $3,000,000 project is **Refinery Engineering Co.**

• **Commerce Oil Refining Corp.** plans to build a $48,000,000, 43,000-bbl. plant at Jamestown, R. I.

• **Continental Oil Co.'s** 11,000-bbl. cat reforming unit at Westlake, La., is scheduled for completion early in 1960. **Bechtel Corp.** is contractor.

D

• **DX Sunray Oil Co.** will add a $7-million solvent-dewaxing plant at the Tulsa refinery to produce microcrystalline wax. Completion is scheduled August 1, 1960. **Foster Wheeler Corp.** has the contract.

F

• **Farmers Union Central Exchange, Inc.,** will complete in May 1960 a 7,100-bbl. Unifiner using gasoline distillate feed.

G

• **General Petroleum Corp.** is adding a $4.5-million, 9,300-bbl. delayed coker at its Torrance, Calif., refinery. When completed in early 1960 it will boost coking capacity to 35,000 bbl. daily. Contractor is **Bechtel Corp.** Platinum reformer capacity will be increased from 12,000 bbl. to 20,000 bbl. in September 1959. **C. F. Braun & Co.** is contractor on this project.

H

• **Hess Trading & Transport, Inc.,** is expanding its Sewaren, N. J., refinery from 45,000 bbl. to 75,000 bbl. **Lummus Co.** has the contract. Hess also plans to add a fluid catalytic cracking unit and a Udex unit.

• **Howell Refining Co.** is increasing crude capacity from 5,000 to 6,500 bbl. at Corpus Christi. Completion by company crews is scheduled in January 1960.

• **Husky Hi-Power, Inc.,** has been studying plans to increase capacity of its 6,500-bbl. Cody, Wyo. plant.

PLANT CONSTRUCTION (continued)

I

• **Imperial Oil, Ltd.,** will build a 1,500-bbl. alkylation unit at its Edmonton, Alta., refinery. Completion is scheduled by April 1960.

At Sarnia, contract has been awarded to **Canadian Bechtel, Ltd.,** for construction of a 1,500-bbl. alkylation plant. Completion is set for February 1960.

At Regina, a $3,000,000, 2,800-bbl. Powerformer will be completed this fall. **Canadian Kellogg Co., Ltd.,** is contractor.

At Winnipeg, a $3,000,000, 740-bbl. hydrofluoric acid alkylation unit will be completed this fall. **Canadian Bechtel, Ltd.,** is contractor.

• **Irving Refining, Ltd.** (Irving Oil Co. and Standard Oil Co. of British Columbia, Ltd.) is scheduled to complete its new 38,000-bbl. refinery at St. Johns, N. B., early in 1960. Cost will be between $45 and $50 million, and **Canadian Bechtel, Ltd.,** has the contract. The plant will include a two-stage crude unit, a 13,000-bbl. fluid cat cracker (30% recycle), a 7,150-bbl. cat reformer, a 5,000-bbl. hydrodesulfurization unit, and a 2,500-bbl. hydrogen-treating unit.

L

• **Lion Oil Co.,** Division of Monsanto Chemical Co., is scheduled to complete its big program at El Dorado, Ark., by April 1, 1960. This includes increase in the following capacities: Vacuum unit charging topped crude from 18,400 to 19,800 bbl.; fluid cat cracker unit from 5,400 to 7,864 bbl. with recycle of 855 bbl.; Thermofor unit from 6,400 to 7,670 bbl.; sulfuric acid alkylation unit from 1,200 to 1,800 bbl.; catalytic polymerization unit from 350 to 600 bbl.; and straightrun basic asphalt from 2,700 to 2,800 bbl.

M

• **Magnolia Petroleum Co.** is increasing fresh-feed capacity of the cat reformer from 24,000 to 44,000 bbl. at its Beaumont, Tex. refinery. Contractor is **Fluor Corp.**

N

• **North American Petroleum Corp.** has acquired site for proposed plant at Corpus Christi, Tex.

P

• **Pacific Supply Cooperative** has acquired site for proposed plant at Vancouver, Wash.

• **Phillips Petroleum Co.'s** 6,600-bbl. HF alkylation unit at Kansas City, Kans., is scheduled for completion late in 1959.

R

• **R. I. Oil & Refining Co., Inc.,** plans a plant at Tiverton, R. I.

• **Richfield Oil Corp.** plans a $50-million refinery at Everett, Wash., with probable completion in 1965.

• **Royalite Oil Co., Ltd.,** plans to build a separation plant to process Athabasca oil sands at Mildred Lake, Alta.

S

• **Shell Oil Co.** is increasing capacity at Wood River, Ill., from 184,000 bbl. to 195,000 bbl., with completion scheduled by September 1959.

• **Shell Oil Co. of Canada, Ltd.,** is scheduled to complete a 20,000-bbl. plant at Bronte, Ont., near Toronto in 1960.

• **Signal Oil & Gas Co.** plans to build a 40,000-bbl. refinery either at Long Beach, Calif., or at Huntington Beach.

The 12,000-bbl. Bakersfield refinery (acquired from Bankline Oil Co.) will be modernized and expanded.

• **Sinclair Refining Co.** is scheduled to complete a 5,000-bbl. sulfuric acid alkylation unit at East Chicago, Ill., late in 1959 or early 1960.

• **South Penn Oil Co.** will build a $1,250,000 alkylation unit at its Rouseville, Pa., refinery.

• **Southland Co.** has purchased site at Black Point, Fla., for a proposed $8,000,000 15,000-bbl. refinery.

• **Southeastern Refineries, Inc.,** plans a 5,000-bbl. asphalt plant at Savannah, Ga.

• **Standard Oil Co. of California** will build a $75,000,000, 60,000-bbl. plant near Everett, Wash.

A $40,000,000, 25,000-bbl. refinery is scheduled for completion by late 1960 or early 1961 at Barbers Point, Oahu Island, Hawaii. **Hawaiian Dredging & Construction Co.** and **Bechtel Corp.** have contracts for process equipment.

A new polymer plant is scheduled for completion at Richmond, Calif., late in 1959.

• **Standard Oil Co. (Indiana),** using company forces, will complete a 36,000-bbl. vacuum unit at Whiting, Ind., by late 1959. Capacity of the fluid cat cracker will also be increased from 70,000 to 80,000 bbl. by 1960.

• **Sunshine State Refineries, Ltd.,** plans a 25,000-bbl. refinery in the Tampa, Fla., area.

T

• **Texaco Inc.** is building a 1,600-bbl. sulfuric acid alkylation unit at El Paso, Tex., with completion scheduled by the end of 1959.

At Wilmington, Calif., a 12,000-bbl. catalytic reformer and a 12,000-bbl. hydrotreater are scheduled for completion by June 1960.

At West Tulsa, Okla., an 1,800-bbl. sulfuric acid alkylation unit and a 500-bbl. isomerization unit will be completed by the end of the year.

• **Texaco-Canada, Ltd.,** plans to add a 2,200-bbl. sulfuric acid alkylation plant, including feed preparation and treating, at its Montreal East, Que., refinery. Contractor is **Foster Wheeler, Ltd.**

• **Texas American Asphalt Co.** plans to build two asphalt plants at Ennis, south of Dallas, and La Coste, west of San Antonio.

V

• **Vickers Petroleum Co., Inc.,** has been considering expansion of catalytic polymerization at Potwin, Kans.

W

• **Western Natural Gas Co.** (formerly McBride) is rebuilding the Brownsville, Tex. plant to produce road asphalt. It will have a daily capacity of 5,000 to 6,000 bbl.

Petrochemical Plants

A

• **Allied Chemical Corp.,** Semet Solvay Petrochemical Division, plans to increase capacity of its Tonawanda, N. Y., plant by 50%, or a total of 30,000,000 lb. per year. Principal products at the plant are polyethylene-resin pipe compound and high-melting-point polyethylene wax.

Site is not determined yet for a proposed polyethylene plant to produce both low and high-molecular-weight polymers. It will be in an area where ethylene is readily available in substantial quantities.

• **American Chemical Corp.** (Richfield Oil Corp. and Stauffer Chemical Co.) is building new facilities for production of ethyl chloride, ethylene dichloride, and vinyl-chloride monomer at Long Beach, Calif. Completion of this $7.5-million project is scheduled in January 1960. A unit for production of vinyl-chloride polymer will be completed about April 1960.

• **American Cyanamid Co.** is planning to build facilities for acrylonitrile derivatives at its Fortier plant at Avondale, La.

• **AviSun Corp.** (Sun Oil Co. and American Viscose Corp.) is converting Koppers Co., Inc., facilities at Port Reading, N. J., for production of polypropylene resins from olefins. Completion was expected by mid-year 1959, with capacity of 20,000,000 lb. per year.

At New Castle, Del., construction is under way on a pilot plant and a film plant for production of film, filament, and staple fibers, using polypropylene resins as raw material. Pilot plant, scheduled for completion in early fall 1959, will have capacity of 500,000 lb. per year. Film plant will have capacity of 10,000,000 lb. per year.

C

• **California-Spray Chemical Corp.** (subsidiary of California Chemical Co.), is building a new plant at Kennewick, Wash., for production of 150 tons of ammonium nitrate per day, 250 tons of complex pelletized fertilizers per day, and fertilizer solutions. Cost of the plant will be $4,600,000.

• **Callery Chemical Co.** will start operation of its Muskogee, Okla., plant this fall. High-energy fuel will be made from natural gas and boric acid. The $38-million plant will be operated under Navy contracts.

• **Canadian Industries, Ltd.,** will increase polyethylene capacity at Edmonton, Alta., from 22,000,000 lb. to 40,000,000 lb. per year. Completion is scheduled in the fall of 1959.

• **Carbide Chemicals Co.,** Division of Union Carbide Canada, Ltd., will increase capacity of polyethylene at Montreal East, Que., from 40,000,000 lb. per year to 65,000,000 lb. by mid-1960.

• **Celanese Corp. of America** will double capacity of its acetic acid plant at Pampa, Tex., boosting total capacity to 240,000,000 lb. annually, with completion set for late 1959.

• **Columbia Gas System, Inc.,** plans to add facilities for production of ethylene at its fractionation plant at Siloam, Ky.

• **Continental Carbon Co.** will raise yearly production capacity from 45,000,000 lb. to 70,000,000 lb. of high-abrasive carbon black at its Lake Charles, La., plant.

• **Consolidated Mining & Smelting Co. of Canada, Ltd.,** will complete a 36,000-ton per year urea plant at Calgary, Alta., in 1960. The project will cost $5,000,000.

• **Cooperative Farm Chemicals Association** will complete facilities at Lawrence, Kans., this fall to increase ammonia production from 180 to 270 tons per day and to produce 30 tons of 100% urea daily. This, plus planned nitric acid capacity of 120 tons daily, will provide 100 tons daily of urea nitrate solutions. The latter facilities will be completed early in 1960.

PLANT CONSTRUCTION (continued)

• **Cosden Petroleum Corp.** is increasing polybutene capacity at Big Spring, Tex., to 2,400,000 gal. per year, with completion scheduled in August 1959.

D

• **Devon-Palmer Oils, Ltd.,** and **Texas Gulf Sulphur Co., Inc.,** were scheduled to complete a $6-million, 370-ton per day sulful plant 12 miles southeast of Calgary, Alta., in mid-1959, with capacity to process 30,000 M.c.f. daily of Okotoks gas.

• **Diamond Alkali Co.** is considering a $10-million, 40-ton per day acetylene plant at its Deer Park Plant at Pasadena, Tex.

• **Dow Badische Chemical Co.** is scheduled to complete facilities at Freeport, Tex., for manufacture of products derived from acetylene in December 1959.

• **Dow Chemical Co.** will complete facilities for production of polyethylene at Plaquemine, La., in October 1960. Facilities to produce vinylidene chloride and methyl chloroform will be completed by May 1961. Cost of the new facilities will be about $12 million.

At Bay City, Mich., polyethylene facilities will be completed by the end of the summer 1959.

• **Dow Chemical of Canada, Ltd.,** has engineering studies under way for caustic soda, chlorine, and phenol operation in western Canada. The caustic and chlorine will lead to certain petrochemicals almost immediately, but the range has not yet been decided.

• **du Pont, E. I. de Nemours & Co.,** will use ethylene to produce linear polyethylene by a low-pressure process at Orange, Tex. Completion of the plant is scheduled by mid-1960.

At Florence, S. C., Du Pont will double capacity of polyester film, with completion scheduled early in 1961.

At Gibbstown, N. J., Du Pont is revising operations to make hydrogen by reforming natural gas and is building new anhydrous ammonia units. Startup of these facilities was expected in midsummer 1959.

• **Du Pont Co. of Canada, Ltd.,** will complete its low-pressure-process polyethylene plant at Sarnia, Ont., during the first quarter of 1960.

E

• **Esso Standard Oil Co.** is building a plant to produce chlorinated butyl rubber and facilities to manufacture butyl latex at Baton Rouge, La. The Oxo plant will be modified for production of a broader range of Oxo alcohols. In 1960, expansion program will include facilities for brominated butyl rubber, using liquid fractions as raw material. Also, improvements will be made to butyl rubber feed-stock facilities in 1960.

At Bayonne, N. J., this year's construction program includes facilities to produce new multifunctional viscosity-index-improver pour-depressant lube-oil additives. In 1960, the facilities to produce pour depressants and extreme-pressure additives will be modified.

F

• **Firestone Tire & Rubber Co.,** Synthetic Rubber & Latex Division, will boost capacity of its Orange, Tex., butadiene plant by 30,000 tons per year. Facilities for production of butadiene-based rubber will be completed by late 1960. Facilities for production of isoprene-based rubber are scheduled for completion early in 1961.

• **Foster Grant Co., Inc.,** will expand styrene capacity from 105,000,000 to 120,000,000 lb. per year in 1960 at its Baton Rouge, La., plant.

G

• **Gulf Oil Corp.** will install a new plant at Philadelphia for production of 35,000,000 to 40,000,000 lb. of Oxo alcohols. Completion is scheduled early in 1961. Additional facilities to produce Oxo derivatives will follow.

H

• **Hawaiian Extruders, Inc.** (formed by Pacific Chemical & Fertilizer Co. and Dow Chemical Co.) will manufacture polyethylene film and film products in Hawaii.

• **Humble Oil & Refining Co.** will complete new facilities for production of 40,000,000 lb. per year of polypropylene at Baytown, Tex., in January 1960.

J

• **Jefferson Lake Petrochemicals of Canada, Ltd.,** plans to build two new sulfur-recovery plants. One would be just east of Calgary and the other in the Savanna Creek area. The first is expected on stream in November 1960.

K

• **Koppers Co., Inc.,** Plastics Division, is considering doubling capacity for polyethylene production at Port Arthur, Tex.

M

• **Magnolia Petroleum Co.** will build new facilities for production of 380,000,000 lb per year of ethylene; 100,000,000 lb. per year of propylene; and 20,000,000 lb. per year of butadiene at Beaumont, Tex. Completion of the $25-million project is scheduled the first quarter of 1961.

• **Mississippi Chemical Corp.** was scheduled to complete a 100-ton-daily urea plant this summer at Yazoo City.

• **Monsanto Chemical Co.,** Lion Oil Co. Division, is building a new propylene tetramer unit at its El Dorado, Ark., refinery, with completion scheduled this year.

• **Monsanto Chemical Co.,** Plastics Division, will boost capacity of its polyethylene facilities at Texas City to 100,000,000 lb. per year, with the expansion scheduled for completion late in 1959.

N

• **Novamont Corp.** (subsidiary of Montecatini) will build a $10-million plant at Neal, W. Va., with capacity of 10,000,000 lb. per year of polypropylene and other polyolefins. Completion is due within 2 years.

P

• **Phillips Chemical Co.** will expand its ethylene capacity at Sweeny, Tex., from 180,000,000 lb. per year to 255,000,000 lb. by the end of 1959.

• **Polymer Corp., Ltd.** (Crown owned), is planning a $15-million butadiene plant at Red Deer, Alta., with estimated capacity between 25,000 and 30,000 tons per year.

R

• **Reichhold Chemicals, Inc.,** is scheduled to complete a $5-million phthalic-anhydride plant at Elizabeth, N. J., late this year. Annual capacity will be 30,000,000 lb.

S

• **Shell Chemical Corp.** will complete facilities to make acrolein and 35,000,000 lb. per year of glycerin at Norco, La., late in 1959. Cost will be more than $10 million.

A synthetic-resins and plastic plant is planned on a 180-acre tract in New Jersey purchased from Swarthmore College across the Delaware River from Philadelphia.

And at Torrance, Calif., isoprene rubber was being produced at a rate averaging 5 tons per day earlier in 1959, but this was expected to be increased to 15,000 to 20,000 tons annually on a steady basis.

• **Sohio Chemical Co.** (subsidiary of Standard Oil Co. of Ohio) is scheduled to complete a new plant to manufacture acrylonitrile at Lima, Ohio, in 1960.

• **Spencer Chemical Co.** is expanding its polyethylene plant at Orange, Tex., with completion scheduled by the summer of 1960.

• **SunOlin Chemical Co.** (Sun Oil Co. and Olin Mathieson Chemical Corp.) is building a new plant at North Claymont, Del., to produce urea from ammonia and carbon dioxide. Capacity of the $8-million project will be 73,000 tons per year when completed in the spring of 1960.

T

• **Texas Butadiene & Chemical Corp.** will complete facilities for propylene concentrate at Channelview, Tex., in September 1959.

U

• **Union Carbide Chemicals Corp.** is building a 72,000,000-lb. per year polyethylene plant at Whiting, Ind.

• **U. S. Industrial Chemicals Co.,** division of National Distillers & Chemical Corp., will double capacity of its new polyethylene plant at Houston, from the current 75,000,000 lb. per year to 150,000,000 lb. in 1960.

Field Processing Plants

A

• **Arkansas Fuel Oil Corp.** is scheduled to complete a new plant with absorption-type facilities at May field, Kleberg County, near Kingsville, Tex., in October 1959. Capacity will be 34,000 M.c.f. daily.

B

• **Bay Petroleum Co.** (a division of Tennessee Gas Transmission Co.) is scheduled to complete a new plant in Aransas County, near Fulton, Tex., in September 1959. Capacity is 50,000 M.c.f. daily, and contractor is **O. L. Olsen Co.**

• **British American Oil Co., Ltd.,** is increasing capacity of its Pincher Creek, Alberta, gas plant from 120,000 M.c.f. to 180,000 M.c.f. daily. Completion is scheduled in September 1959, and contractor is **R. M. Parsons Co. of Canada, Ltd.**

Capacity of the Nevis gas plant in Alberta will be increased from the present 15,000 M.c.f. to 35,000 M.c.f. daily when expansion program is completed this fall. **Poole-Pritchard** has contract for construction of sulfur and boiler facilities, and **Brown & Root, Ltd.,** has contract for hydrocarbon facilities.

C

• **Canadian Petrofina, Ltd., Pan American Petroleum Corp.,** and **Hudson's Bay Oil & Gas Co., Ltd.,** was scheduled to build a $3 to $3½-million cycling plant in Windfall field near Whitecourt, Alta. Operator of the 30,000 M.c.f. plant will be Canadian Fina. Products will include natural gasoline, butane, and propane.

• **CM&M Gas Products Plant, Inc.** will increase capacity of its Bridgeport, Wise

PLANT CONSTRUCTION (continued)

County, Texas, plant from 100,000 M.c.f. to 150,000 M.c.f. daily. Completion of the $750,000 project is scheduled late this fall.

E

• **El Paso Natural Gas Co.** is scheduled to complete a new 150,000 M.c.f. daily plant in Aneth field, San Juan County, near Blanding, Utah, by September 1959. Facilities for deethanizing and sweetening products are included. **Fish Engineering Corp.** is contractor.

H

• **Home Oil Co., Ltd.,** will build and operate a plant southwest of the Carstairs area of Alberta. Capacity will be 75,000 M.c.f. daily, with completion scheduled in March 1960.

• **Hudson's Bay Oil & Gas Co., Ltd.,** was expected to complete a new pressure-maintenance plant at Sundre field, Alberta, by October 1959. Capacity of the $500,000 project will be 3,500 M.c.f. daily.

• **Humble Oil & Refining Co.** is scheduled to complete a natural-gasoline and cycling plant in Kleberg County, Texas, late in 1960. Location is 15 miles south of Kingsville. Capacity will be 200,000 M.c.f. daily and 28,000 bbl. daily of liquid products. Contractor is **Hudson Engineering Corp.**

L

• **Lone Star Gas Co.'s** expansion program at its Springtown plant in Parker County, Texas, is scheduled for completion in December 1959. The $1,400,000 program will boost capacity from 125,000 M.c.f. to 200,000 M.c.f. daily.

• **NGL Corp.,** Houston, plans to build a 20,000-bbl. processing plant south of Orange, Tex., on the Sabine River. The plant would process natural-gas condensate, distillate, and natural gasoline, and would turn out 98-octane gasoline initially. Construction may start in August with completion by October 1960. The plant itself is expected to cost $6 million.

S

• **Shell Oil Co.** will complete a cycling and gas-processing plant at Weeks Island field in Iberia Parish, about 20 miles south of New Iberia, La., December 1, 1959. Capacity will be 120,000 M.c.f. daily. **Farnsworth & Chambers Co., Inc.,** has contract.

• **Skelly Oil Co.** and **Sinclair Oil & Gas Co.** will build a 20,000 M.c.f. plant in Maljamar and Loco Hills field of Eddy County, New Mexico. The plant, which will recover 48,000 gal. of liquids daily, will be ready for operation in April 1960.

• **Standard Oil Co. of California** is building a gas-processing plant at Nevis field, Alberta. Capacity will be 43,000 M.c.f. daily, and contractor is **Fluor Corp. Ltd.**

• **Steelman Gas Ltd.,** is expanding capacity of gas-conservation plant at Steelman, Sask., from 25,000 M.c.f. daily to 33,000 M.c.f. daily.

• **Sunray Mid-Continent Oil Co.** was scheduled to complete a new plant in the East Criner area, McClain County, Oklahoma, in July 1959. The refrigerated absorption plant, with capacity of 5,000 M.c.f. daily, is near the town of Purcell. **Pona Engineers, Inc.,** has the contract.

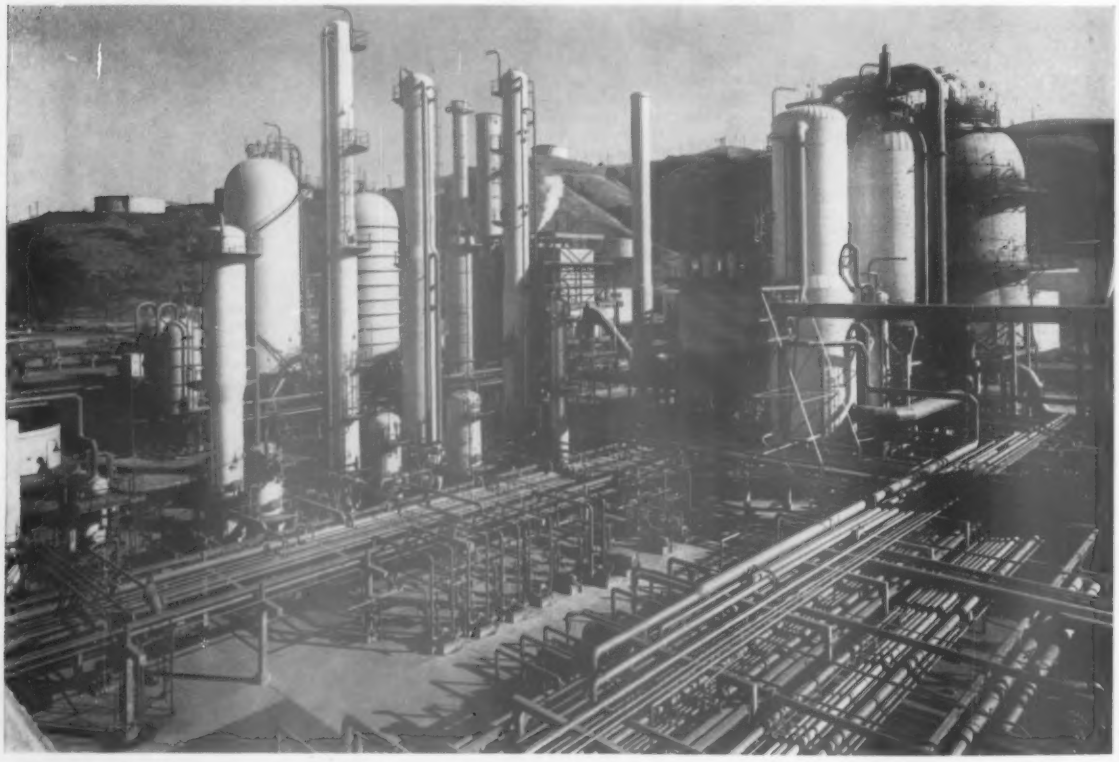
T

• **Texas Natural Gasoline Corp.** is building a natural-gasoline plant at Rayne, La., on Columbia Gulf Transmission's natural-gas line, which extends from Louisiana to eastern Kentucky. Capacity will be 700,000 M.c.f. daily, and completion is set for January 1, 1960. **Fluor Corp.** is the contractor.

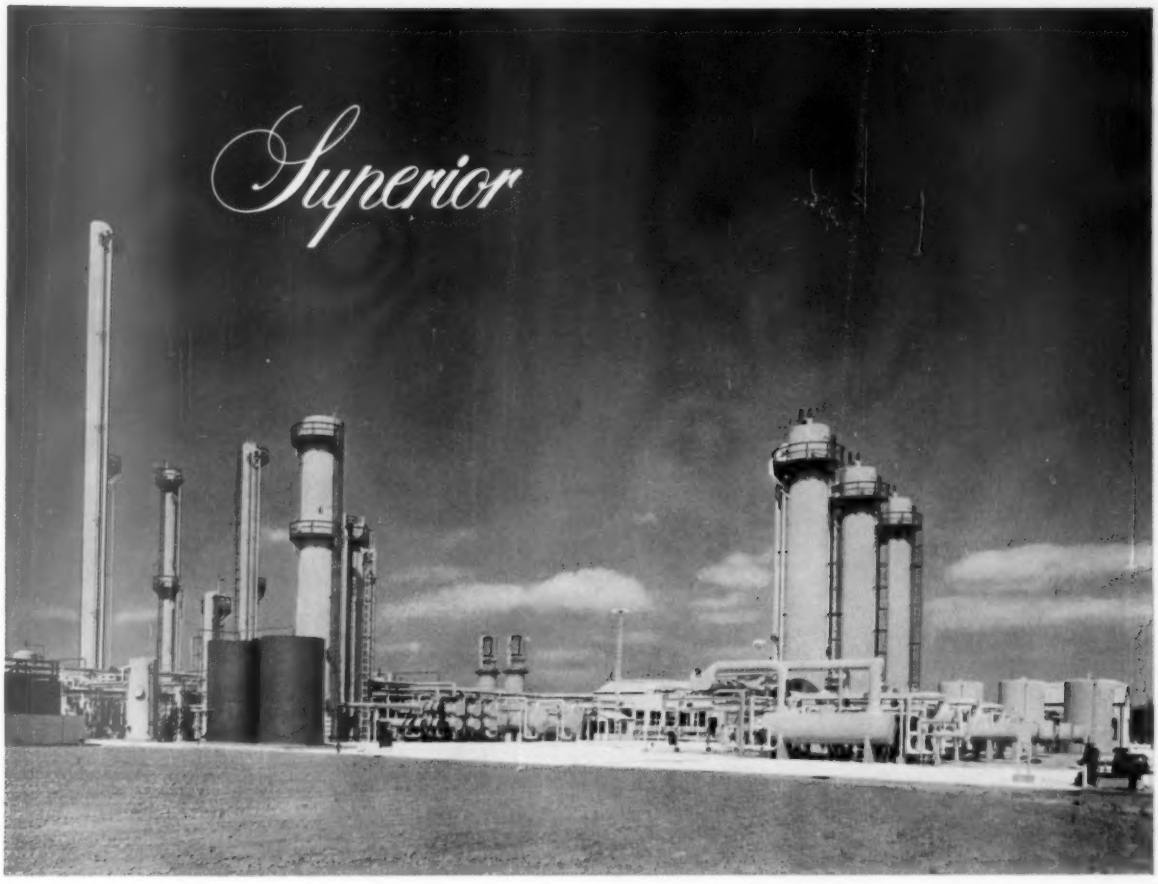
• **Tidewater Oil Co.** will build a new plant in Northeast Texas to process 50,000 M.c.f. of gas daily, produce 224 tons of sulfur, and recover 7,480 bbl. of liquid products daily. The project in New Hope-Smackover field also includes drilling four injection wells to the Smackover.

W

• **Warren Petroleum Corp** and **Sunray Mid-Continent Oil Co.** are building a new 100,000 M.c.f. plant near Mocane pool in Beaver County, Oklahoma. It is the refrigeration-absorption type with liquid output of 100,000 gal. daily. Warren will operate the $3,000,000 plant which is scheduled for completion by September 1959. **Dresser Engineering Co.** of Tulsa has contract.



A new fluid cat cracker is on stream at the big Richmond refinery of Standard Oil Co. of California. The giant 55,000-bbl. per day unit, which is pastel colored and covers 12 acres, was built in less than a year. The cat cracker was the major addition in a multimillion-dollar expansion program which included a 4,500-bbl. alkylation unit and a 2,000-bbl. isomerization unit.



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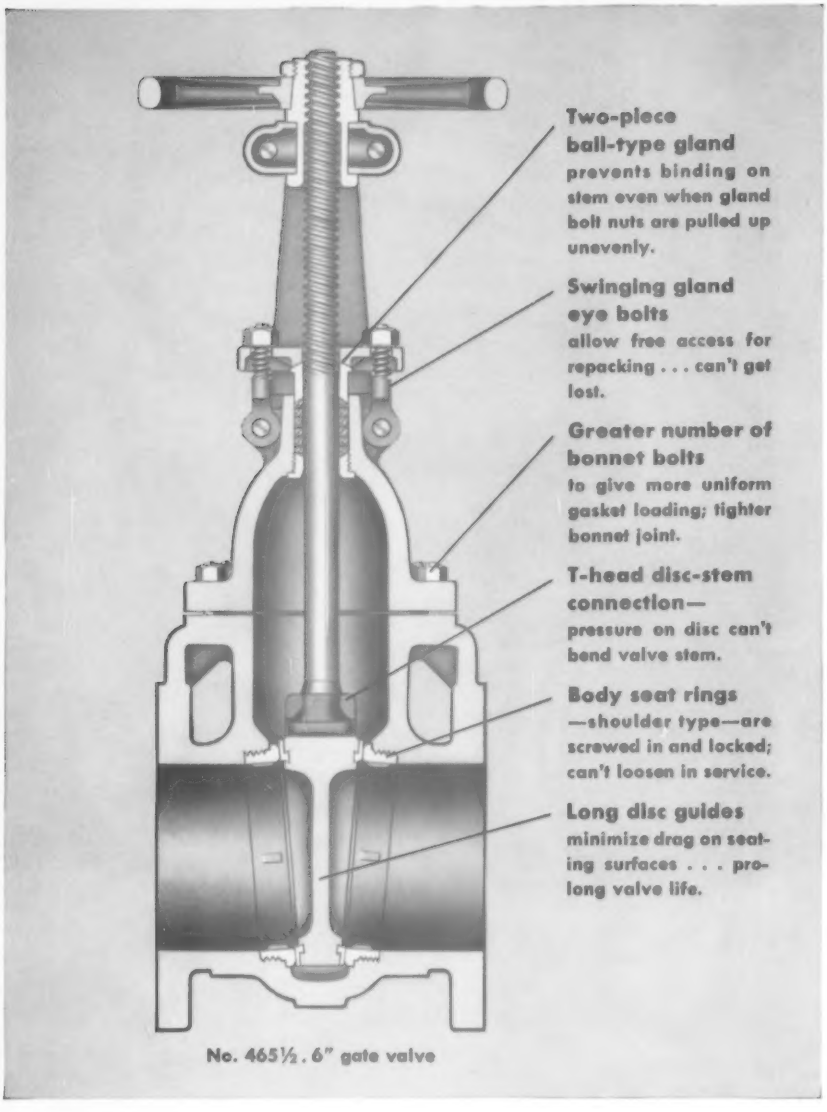
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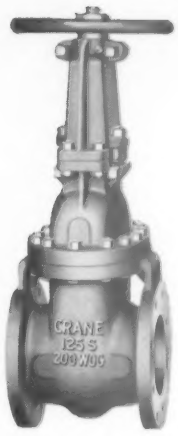
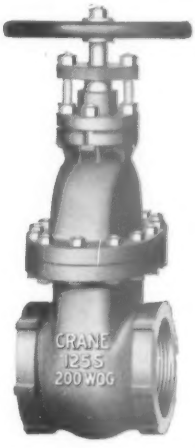


No. 465½. 125-Pound, OS&Y, bronze trimmed. Flanged ends. 2" to 48". Also in all-iron.



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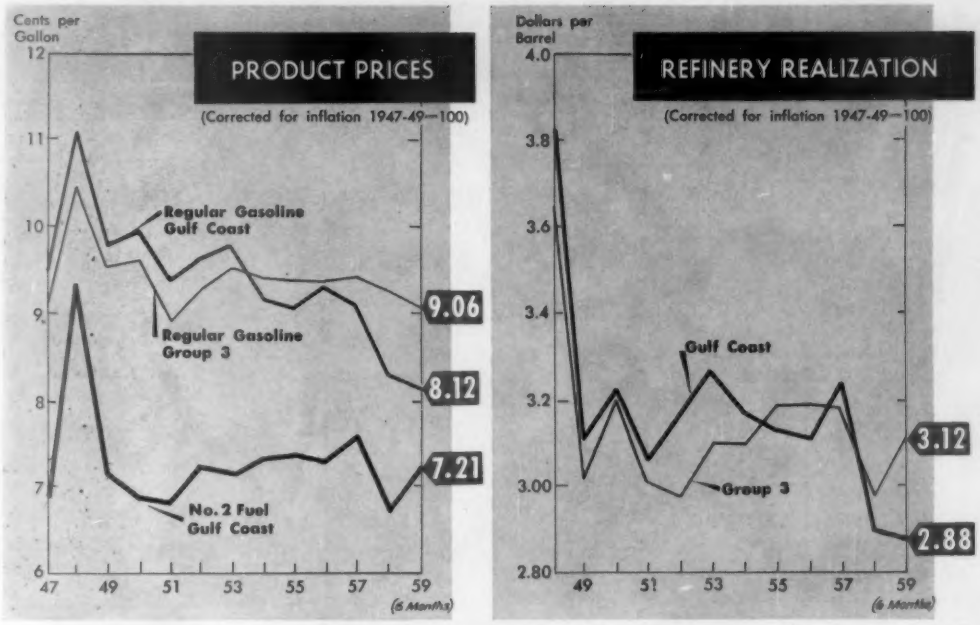


Gasoline takes brunt of price sag

. . . as overproduction deals low blow to products market

PETROLEUM PRODUCT MARKETS were influenced by overproduction in the first half of 1959. Stocks were high and prices were low. Gasoline was hit hardest of all the major products. Residual was the only important product not under selling pressure.

. . . Group 3 gasoline followed the oversupply pattern this year. Stocks increased sharply in the first quarter and the high level of refinery production reduced the withdrawal rate in the second quarter.

Spot gasoline was available on the Group 3 market at 11.50 cents a gallon at the start of the year. The market low dropped to 11.25 cents by the first of February. This dip was followed by mild firming in early March. Some refiners read the signs as an indication of definite strength and raised gasoline prices. Unbranded jobbers balked at higher quotations.

By the middle of May, some refiners needed to move gasoline. They knew that it would take low prices to sell the volumes necessary to provide storage space. The race was on. Since every unbranded jobber was looking for a lower price, the unsettled market resulted in some real bargains.

The end result was a general lowering of the gasoline market. At the end of the first half, Group 3 spot prices for regular were as low as 11.00 cents a gallon or 1.00 cent less than the July peak last year.

This decline developed despite a boost in quality of all regular gasoline shipped through the Great Lakes Pipe Line. After the first of June, all regular gasoline tendered to the line was 91 octane, an increase of 2 octane numbers over previous specifications.

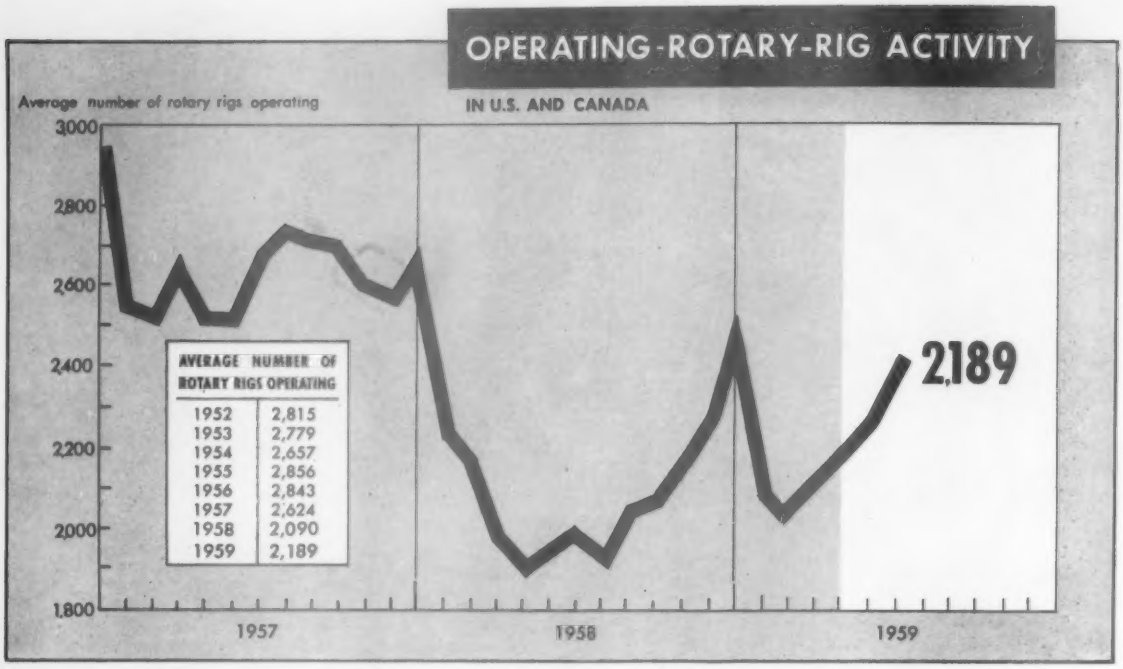
. . . Gulf Coast gasoline prices improved slightly in the last week of June, but there is little chance for the market to return to normal this season.

The cargo price for 92-octane regular was down to 10.00 cents a gallon. That was about half a cent less than lower-quality gasoline was bringing in the summer of 1950.

Take a look at the first of the above charts. The lines show prices after correction for inflation. In terms of 1947-49 dollars, the average spot cargo price for Gulf Coast regular gasoline in the first half of this year was 8.12 cents a gallon. That is the lowest price since the end of World War II.

In true-value dollars, Gulf Coast refiners' realization from a barrel of crude is at the lowest point of the past 10 years. Prices were firming slightly at midyear, but improvement in the last half depends on the supply-demand balance.

Lower cargo prices on the Gulf Coast and reduced refinery prices in District 2 are reflected in reduced tank-wagon postings for both gasoline and heating oils. In the last half of June, marketers on the East Coast announced lower gasoline tank-wagon prices. The same was true for many areas in the North Central states.



Drilling upturn activates more rotaries

THIS YEAR'S spring and summer upturn in drilling activity by midyear had boosted the number of operating rotary rigs in the United States and Canada to more than 430 above those running the same time last year, and to within 130 of 1958's mid-December peak number of 2,565 active rigs.

Except during the first few weeks, in January and February, the number of operating rigs this year has been running well above 1958's level of activity. Only during the brief year-end surge of drilling, a normal trend, did the number of active rigs in 1958 exceed the total now running.

Decline in drilling following the 1958 December peak dropped the number of active rigs to the low mark of 1,996 the first week of February, when the upturn began. This number lacked 126 of dropping to 1958's low mark of 1,870 rigs which came later in the year, in April.

ROTARY-RIG ACTIVITY BY YEARS
(United States and Canada)

Year	No. rigs* Jan. 1	No. rigs* Dec. 31†	Peak No.	Low No.
1959	2,198	†2,376	2,436	1,996
1958	2,373	2,364	2,565	1,870
1957	2,617	2,518	2,842	2,355
1956	3,023	2,759	3,132	2,619
1955	2,683	3,084	‡3,338	2,574
1954	2,735	2,830	2,963	2,439
1953	2,775	2,795	3,079	2,580
1952	2,973	2,801	3,032	2,470
1951	2,406	3,066	3,181	2,119

*Based on Hughes Tool Co. weekly average figures. †1959 figure as of June 30. ‡All-time record number.

ROTARY-RIG ACTIVITY BY STATES

State—	No. rigs* Jan. 1	No. rigs* June 30	Avg. No.	Peak No.	Low No.
Alabama	8	9	8	9	6
Arkansas	15	13	13	19	5
California	87	100	92	104	70
Colorado	31	44	33	56	22
Ill.-Ind.-Ky.	50	62	45	67	9
Kansas	141	154	134	164	109
Louisiana	329	373	333	380	296
North	37	36	33	44	21
South (onshore)	260	285	258	293	227
Offshore	32	52	42	63	32
Michigan	12	26	18	26	10
Mississippi	57	75	61	75	51
Montana	18	23	18	24	0
Nebraska	19	34	25	35	14
New Mexico	102	124	109	138	94
North Dakota	33	27	36	47	27
Oklahoma	194	242	223	259	176
Pennsylvania-Eastern†	15	24	19	25	15
Texas	784	764	745	795	678
South (onshore)	154	208	170	211	127
Offshore	2	1	1	2	0
North and East	168	159	157	176	141
West Central	301	246	264	301	246
West	159	150	153	166	133
Utah	35	34	32	40	25
Wyoming	68	95	64	98	48
Others	7	14	9	14	6
Total U. S.	2,005	2,237	2,017	‡2,284	‡1,781
Canada	193	139	172	232	109
Total	2,198	2,376	2,189	‡2,436	‡1,996

*Based on Hughes Tool Co. weekly figures. †Includes New York, Ohio, and West Virginia. ‡From U. S. and Canada weekly totals.

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What the ZWERDLING DECISION means to independent gas producers

BY HENRY D. RALPH
Chief Editorial Writer

EXAMINER Joseph Zwerdling has given the Federal Power Commission a formula for determining just and reasonable prices for independent producers to use in selling natural gas to interstate pipelines.

He applied the formula to Phillips Petroleum Co. and got a rate schedule averaging 11.66 cents per M.c.f. for pipeline-quality gas delivered to a trunk line.

Zwerdling says his formula can be applied to other gas producers and thus solve the problem that has appeared unsolvable ever since the Supreme Court, 5 years ago, directed FPC to regulate producers' prices.

But hardly anyone agrees with Zwerdling. All parties of interest—producers, transporters, distributors, and regulators—have filed exceptions to some part of the decision.

Sometime this fall the full commission will hear oral arguments on these exceptions. Then the five commissioners will write their own decision—and there is no way of telling whether they will adopt all, some, or none of Zwerdling's formula. After that, without a doubt, this Phillips case will be appealed all the way to the Supreme Court.

In the meantime the decision is of the utmost importance to every gas producer because:

...It is the first big independent-producer rate case to be ready for final FPC decision.

...It has been so well publicized and so bitterly fought that it may set many precedents.

...It deals with just about every problem of producer regulation.

...It is the first specific outline—good, bad, or indifferent—of how to go about handling a case like this before FPC.

...It gives other producers some guides for preparing their own cases by highlighting the major issues which they must be prepared to face.

I. Method of Determining Cost

THREE BIG QUESTIONS have popped up immediately in every attempt to inquire into how much it costs an independent producer to find, produce, and sell a batch of gas to a pipeline. These are:

1. Should the study be made on a company-wide basis, on a well-by-well or lease-by-lease basis, on an area basis, or on a contract-by-contract basis?

2. Where both oil and gas are produced from the same lease, how shall the production cost be allocated between the two products so that each bears its fair share?

3. How shall exploration costs be determined—in other words, what does it cost to find gas?

In the Phillips case the examiner decided the first two questions in ways which, in general, may be satisfactory to most independent producers and which probably will not encounter much opposition from other interests—at least at this time.

But Zwerdling's method of fixing exploration costs —the most important and most controversial of all— is headed for a big battle.

1. Company-wide Basis

Phillips produces gas in a great many areas with widely varying cost factors—ranging from the old dry-gas fields of the Panhandle-Hugoton region to the deep offshore areas of the Gulf of Mexico. And it sells to many different pipelines, each one concerned only with the costs in the area where it purchases.

The FPC staff and many of the pipeline and distributor intervenors insisted that Phillips' costs be determined on an area basis.

Zwerdling ruled against this and sided with Phillips' contention that all its gas operations be thrown into the same pot and all costs be averaged out to a single figure.

In great detail Zwerdling analyzed all the proposals for area-cost methods and disposed of them in what appears to be a thoroughly devastating fashion. If the question is raised again in other cases, independent

Purpose of this article is to outline the examiner's decision in the Phillips gas case in nontechnical terms so that an independent producer can:

- find his way around in the 217-page document;
- understand the major issues as they are appealed to FPC and the courts;
- realize what he faces if the Zwerdling reasoning is upheld and is applied in other cases.

producers can find much ammunition in Zwerdling's decision in support of the company-wide cost basis.

2. Allocation of Production Costs

Many wells produce both gas and either crude oil or condensate liquids. All major antagonists in the Phillips case agreed on the method to be used in allocating these joint costs—though they had some differences of opinion on details of applying this method.

This is the "relative cost method." Phillips has many leases that produce gas only and many that produce oil only, and it supplied cost figures on each for the test year 1954 which served as yardsticks. Then the operating costs of joint-product leases were allocated on the porportions of gas and liquids produced.

This method could be extremely unfair to some other producers. Phillips' gas production is far higher in relation to its oil production than is the case with most producers. Also, much of its gas is from the old low-cost, dry-gas Hugoton-Panhandle region. Applied to a different set of facts, the "relative cost method" might produce highly incongruous results.

3. Allocating Exploration Costs

If a company explored only for gas, found only gas, and produced no crude oil or condensate whatever, its finding costs would be its total historic expenditures for all purposes directly or indirectly related to exploration.

In the early days of discussion of regulating producers' prices some people not familiar with the gas business wanted to exclude from the rate base any expenditures that did not result in discoveries—such as dry holes, delay rentals, or surrendered leases.

This theory has been pretty well discredited, and Zwerdling appears to have scotched it permanently. Throughout his decision he follows the philosophy that all exploration activities and expenditures normal to a prudent oil and gas operator are necessary functions of increasing the nation's gas reserves, and that therefore a producer's cost-of-service computation should include all customary items of exploration expense, including those resulting in no discoveries.

As the Phillips case goes to the commission it involves no fundamental issues over the company's total oil-and-gas exploration costs.

The big issue is how to divide total exploration costs between gas discovered and oil discovered. This issue is, and perhaps always will be, the most controversial and perplexing of all problems connected with determining the cost of gas.

Phillips said that 60% of its exploration effort is devoted to finding gas. Zwerdling calculated it at 30%. Various parties to the case came up with computations of 20, 23, and 25%, each using a different accounting formula.

The "B.t.u. Method" . . . Phillips fought vigorously for the "B.t.u. method"—the method advocated by independent producers generally.

It's beautifully simple. The company's total proved reserves are divided between gas and liquids on the basis of their B.t.u., or energy, content—6 million B.t.u. in a barrel of oil and 1 million B.t.u. in an M.c.f. of gas.

There's only one trouble with it: It shows that the cost of finding gas is pretty high. This is a revolting shock to people who have contended that gas is found by accident while looking for oil and therefore its exploration cost is practically nil.

That isn't the reason Zwerdling gave for rejecting it. He said the significant difference between oil and gas is physical form, not energy content. Phillips ar-

The three facets of Zwerdling

TO understand the 317-page Zwerdling decision it should be realized that its many chapters and subsections deal with three distinct problems of setting producers' sales prices. These are:

1. Costing methods—accounting formulas and bookkeeping practices for determining what it costs a producer to find gas and turn it over to the purchaser.

2. Cost recovery—how many gross dollars a producer should get from his interstate sales in order to recover his costs plus a fair profit.

3. Rate application—framing a price schedule that will yield the desired annual gross income from the producer's total sales to many customers under varying conditions.

All of these are knotty problems and the commission must solve them all properly before regulation can work. The solutions to the three must dovetail to net a satisfactory end result, but they are considered separately in any individual rate case.

gued that exploration is a search for energy, that form has no importance until a sale is made, and that selling price is no measure of discovery cost.

Zwerdling used the "reserves-added realization method" (RAR) which he described as "allocation between oil and gas on the relative commercial importance of the additions to their respective reserves through successful exploration over a period of time."

Zwerdling used many pages to defend the RAR method, but his principal points are:

. . . it allocates joint exploration costs on the basis of what Phillips expected to find; and

. . . since exploration costs consist largely of the cost of unsuccessful exploration, the products should share the costs of unsuccessful exploration to the extent that each shared in the benefits and results of the successful exploration activity.

Producers are unanimous in contending that the B.t.u. method is the only way to allocate exploration costs. They say the RAR method is just a complicated version of the FPC staff's completely impractical "sales realization method" in that it values unproduced reserves at what they would sell for if produced currently.

One objection to the RAR method is what has come to be called "circularity." This means basing price on cost, basing cost on value, basing value on price—and ending up right where you started.

So the big issue in exploration costs is B.t.u. vs. RAR.

The utility formula

CHIEF producer criticism is that the examiner used the utility-type cost-of-service approach in arriving at "just and reasonable" prices.

Actually, there is no choice but to start with that attempt. The courts have said FPC must try to apply the cost method and must use it at least as an "anchor," or a "point of departure."

Zwerdling stayed anchored to the method and found no point for departure.

But other trial examiners, and the commission itself, have departed from strict cost application in some less-publicized producer cases. However, the courts apparently will require good reasons why the cost-of-service determination alone is not sufficient basis for setting prices.

Therefore all producers must:

First, make an honest effort to show from their books what it costs them to find, produce, and deliver gas to their interstate pipeline customers.

Second, submit additional evidence and argument to show that other factors must also be considered in arriving at a just and reasonable price.

II. Recovery of Cost

AFTER A PRODUCER'S costs are determined, the next question is how much gross income he is entitled to get from interstate gas sales.

The most important aspects of this are tax treatment and rate of return, and both are squarely at issue in the Phillips case.

1. Tax Treatment.

The statutory depletion allowance and permission to expense intangible drilling costs were nicknamed "phantom taxes" by gas distributors. Some utility accountants call them "negative income taxes."

Zwerdling refused to give Phillips the benefit of these two tax credits. He followed the strict utility-accounting concept that a tax liability is not an element of operating cost until it is paid out in money to the tax collector. This doubtless seems logical to a person unfamiliar with the history, purpose, and operation of the depletion allowance.

All producers, of course, view this disallowance as preposterous. Their lawyers feel that there are many court decisions which will prove Zwerdling 100% wrong and will convince FPC and the courts that Congress intended gas producers to get the benefits of these tax provisions as written into the law.

2. Rate of Return

Most public utilities are allowed to charge rates which will yield about 6% return on their plant investment. All gas producers insist they need much more than this to offset the great risk of losses in continued exploration. The difficulty is to prove it.

Phillips asked a 12% rate of return if given credit for depletion, or 18% if not. The examiner denied depletion and allowed only 9¼%. He based this on straight accounting principles, comparing earnings of a group of oil and gas companies with other industries by the "earnings-book value approach."

Phillips argued at great length that special incentives are needed to obtain the exploration work necessary to maintain the nation's gas reserves and fill consumers' future requirements. Phillips did make a more or less "orthodox" accounting comparison of earnings of oil and gas companies with other industries (and got more favorable results than Zwerdling did), but it contended that this is only a "point of departure" and that additional incentives are essential.

The examiner devoted a lengthy section of his report to rebutting this contention. It will be one of the big issues before FPC on appeal.

3. Special Factors

In Phillips' case there were two special factors which made a big difference in rate of return. Both will be argued hotly on appeal, but they may or may not apply to other producers.

One is treatment of royalties, but there is no dispute that the ordinary landowner's royalty is a legitimate operating expense. The issue involves overriding royalties Phillips retained when selling a big San Juan reserve in place.

The other issue involves purchased gas which Phillips resells. Phillips asked a big allowance in anticipation that its suppliers' prices will go up. The examiner said to wait until this happens and then apply for an increase.

III. Application of Rate

A PRODUCER'S COST of service has been calculated, his fair rate of return has been set. Now comes the prob-

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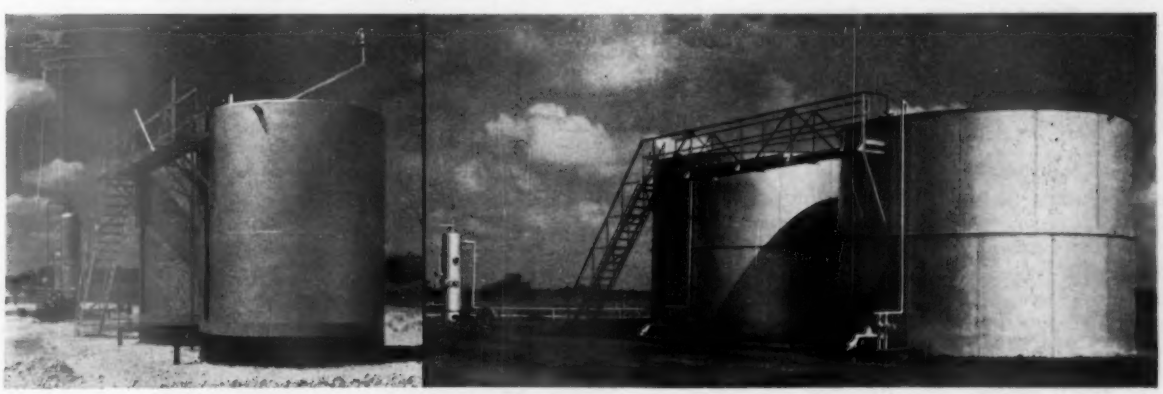

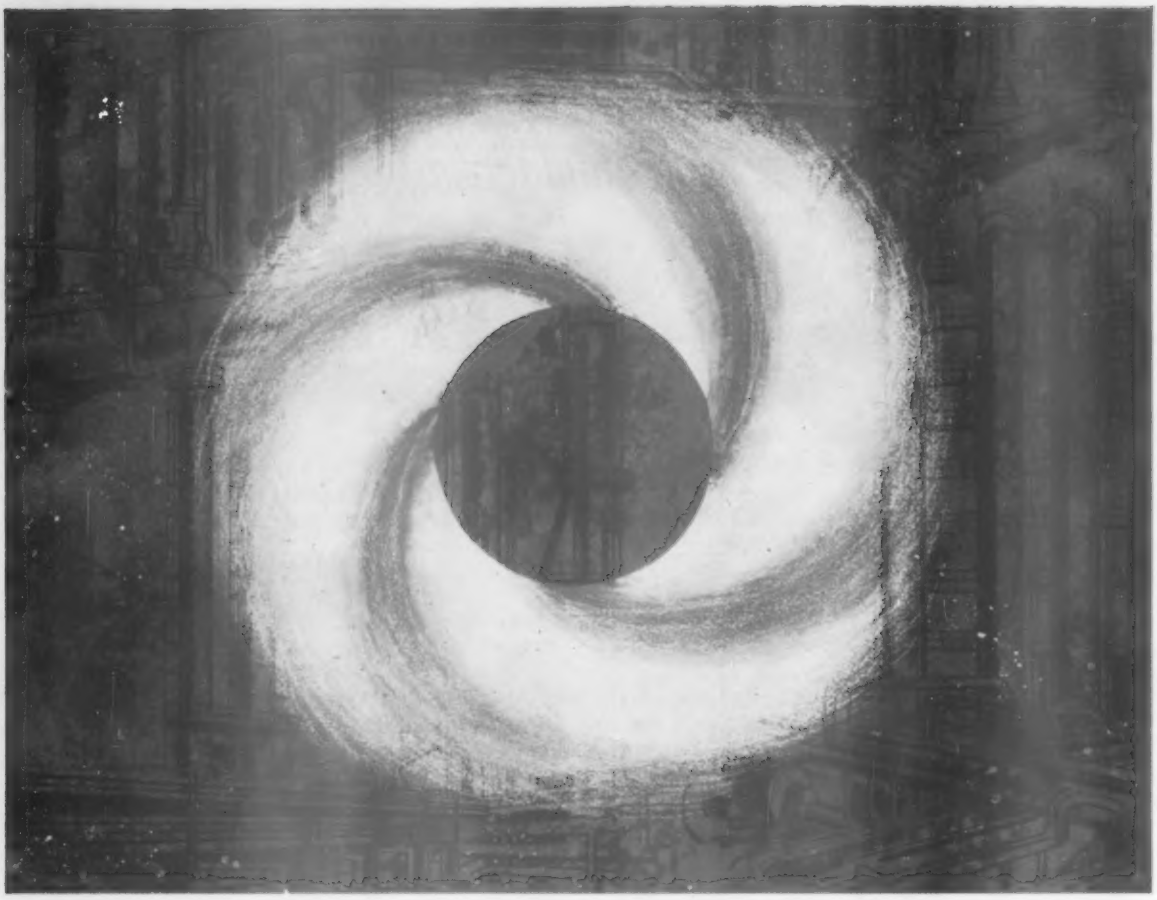

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lem of revising all his sales contracts and determining which customers are going to pay him how much of what he is entitled to get.

Until recently this problem has been almost ignored in all the hassle over cost-of-service methods and rate of return.

But now—and to many people's surprise—it begins to look as though drafting new rate schedules will involve as many insuperable problems and as many to-the-death battles as determining producers' costs.

In fact, it may be that rate application will prove to be the Achilles' heel of the theory that utility-type regulation can be applied to gas producers—the final clincher in demonstrating that it is unworkable—the chief "point of departure" from the utility method.

This is the aspect of regulation that hits purchasers most directly, and in the Phillips case many of them are preparing to make vigorous protests against the examiner's proposed price structure.

It is beginning to appear possible that in the long run consumer opposition to the rate-application of regulation may do more than producer opposition to cost determination in getting away from strict utility-type regulation of field prices.

Tremendous perplexities for both producers and purchasers are foreseen in the rate structure the examiner proposed for Phillips in this case. Five aspects of this formula deserve comment.

1. Sales Below Cost

Zwerdling found that Phillips should get an average of 11.66 cents per M.c.f. It is now selling some gas for more than that and some for less, but the average is below 11.66.

So Zwerdling said to cut the high prices and raise the low ones and make them all 11.66. That sounds simple, but it's not.

Customers due for an increase are screaming like wounded panthers.

Most advocates of producer regulation have contended that prices above cost of service should be cut but that a producer was "stuck with" contracts providing lower prices. Zwerdling demolished this "one-way-street" theory in a great victory for producers. He based his decision not only on a sense of fairness but on a learned analysis of the Supreme Court's decision in the Mobile case.

Opposition lawyers probably can't upset this principle that a business under utility regulation is entitled to raise low prices enough to recover cost. But they are trying to soften the impact by suggesting various sorts of sliding scales and modifications of a flat-price formula.

2. Flat-price Formula

Zwerdling said Phillips should sell gas of the same quality at a uniform price to all customers wherever it produces. This has been nicknamed "postage-stamp rates."

This might seem to be a simple and logical way of setting prices based on a company-wide determination of costs. It is the usual way of setting utility rates.

But Zwerdling expressed grave doubts about it, even though he proposed it. Earlier he had thoroughly demolished the suggestion that Phillips' costs could be determined on any basis other than company-wide. But he foresaw troubles in company-wide uniform prices.

He suggested that, after more experience has been gained and the prices of a number of large producers have been set on a company-wide basis, the FPC should give serious consideration to setting area prices which would be uniform for all producers in that area. This probably would require determination of both company-wide costs for each producer and industry-wide costs within each area and then setting prices high enough to prevent confiscation of any producer.

The lesser issues

CHIEF ATTENTION is focusing on half a dozen major issues which have a big effect on Phillips' prices and which will get most consideration on appeal.

This should not obscure the fact that the examiner also ruled on a score of lesser issues, and in most of these he ruled in favor of Phillips and frequently against the position of the FPC staff.

Many of these lesser issues have puzzled other producers and other trial examiners. There are indications that the principal intervenors in the Phillips case—pipelines and distributing companies—will not vigorously protest many of the lesser rulings at this time but will concentrate on getting FPC and court approval of the major rulings that have a very material effect in keeping Phillips' prices low.

Therefore many of these lesser rulings may become precedents, and if so this could simplify and expedite other producer cases.

Of course many cost-accounting methods acceptable to Phillips may be entirely inapplicable to another producer with different operating conditions. In such cases the producer may have to take the burden of developing a different formula.

Here are some of the issues—doubtless common to all producers—which this examiner decided in favor of Phillips:

... **Natural-gas liquids** are nonjurisdictional. Investment in gasoline plants and profits from them are excluded from FPC consideration. Costs of NGL may be separated from costs of residue gas by a "sales realization method."

... **Nonjurisdictional sales** (such as to an intrastate customer) may be separated simply by dividing total costs by the gas volume of jurisdictional and nonjurisdictional sales.

Subsidiaries should be lumped into the parent's accounts just as though the whole gas operation were a single corporate entity.

... **General and service assets,** such as patents, trademarks, employe recreation facilities, and many other miscellaneous items, should be included in the rate base even though they have little direct bearing on the cost of producing gas.

... **Year-end figures** may be used for property valuation, even though utilities are usually required to compute an average valuation for a given year.

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The Zwerdling Decision

Starts on Page 156

Now Phillips' customers are beginning to discover in the flat-rate formula many of the evils producers have been saying would result from regulation.

Here are three potential results:

(a) Phillips will spend all its exploration and production effort in areas where it can make money at 11.66 cents and will neglect the high-cost areas. Pipelines buying from Phillips' high-cost areas—even if very willing to pay more than 11.66—will soon have no additional supplies to meet their expanding needs.

(b) Phillips' competitors buying, gathering, and processing gas for pipelines can keep on paying more than 11.66 cents—at least until FPC gets around to regulating them and afterward if they can prove a higher cost of service. So Phillips won't be able to buy another foot of gas for resale, nor will any royalty owner give it a lease. Therefore consumers tied to Phillips will get a low price but no new reserves, while competitors paying a bit more in any area can expand.

(c) Wherever 11.66 is less than the going price for the area, everybody will want more of Phillips' cheap gas. FPC may have to ration it among customers—while the supply lasts.

3. Differential Factors

Zwerdling adopted Phillips' suggestion that prices be graduated from about 9 cents to about 15 cents to equalize different quality and delivery conditions such as pressure, gathering distance, and removal of water and sulfur, but to come out to a weighted average of 11.66.

So far there have been no objections to this. It could be a step toward uniformity in contract terms.

4. Timing of Changes

Zwerdling ruled that prices above 11.66 should be cut immediately. Prices below 11.66 can be raised only after Phillips files new schedules and has them approved by FPC—doubtless after lengthy battles with customers who don't take kindly to an increase.

What appears to be an even greater inequity is the treatment proposed for Phillips' price increases of recent years which have been suspended by FPC and are being collected under bond and subject to refund. Suppose a price had been 15 cents from the beginning of a contract many years

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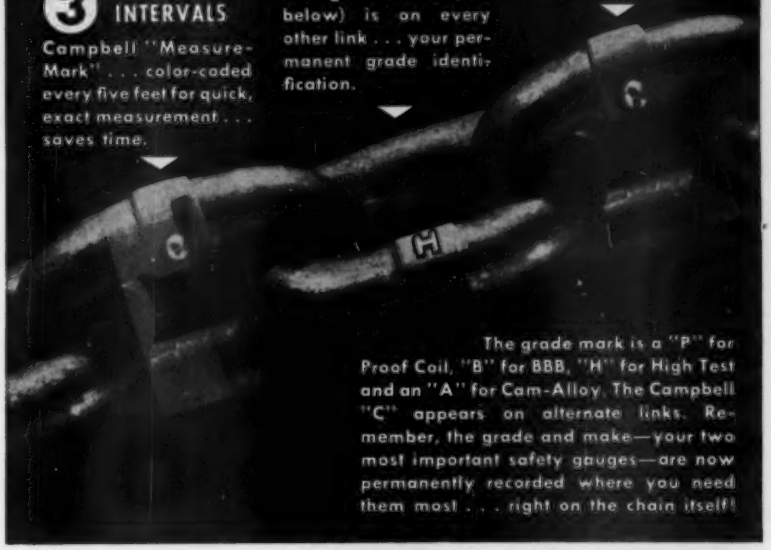

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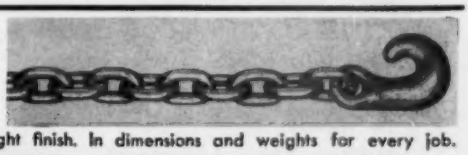

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ago and had recently escalated to 17 cents, with the increase under suspension. Apparently Phillips will have to refund not just the increase but all of the basic price above 11.66, and not just back to the date of the increase but all the way back to 1954 (the date when FPC began this investigation).

This sort of timing of increases and decreases gives all the breaks to purchasers and none to producers. Although the examiner found that Phillips has been losing money on its total gas business, he directs it to lose still more in the immediate future.

5. Future Sales

Phillips must make all future sales at 11.66—unless and until it can fight through another general rate case and convince FPC that its costs have gone up.

This ruling applies even in areas where both Phillips and other producers have recently found plenty of buyers willing to pay more than 11.66 and in areas, such as offshore, where everyone's costs are conceded to be higher than 11.66.

Currently Phillips is exploring and developing new reserves in areas where costs are above 11.66 and where the sales value of the gas is unquestionably higher than 11.66 because of location with respect to prospective purchasers, size of reserves, and competitive conditions in its markets. Since Phillips can't make a new contract for more than 11.66, the only course open would seem to be to sell all its properties in those areas and get out of the gas business.

Presumably Phillips could sell a limited amount of additional gas below its costs in the newer, high-cost areas and offset these losses with profits on sales from the older, low-cost areas. But the more it sells below local cost, the less income it will net on its total business. Then it will have to get FPC to raise prices on its low-cost gas to compensate for losses on the high-cost. Purchasers in the low-cost areas do not relish this prospect.

Meanwhile, competing producers in high-cost areas will not proceed with development work and will not commit their reserves for interstate sale for fear that their prices eventually will be brought down to Phillips' level—either by FPC action or by competitive forces.

Many attorneys believe that FPC has no legal authority to restrict freedom of contract for the future in this manner. It does seem a bit farfetched to say that the price of gas not yet discovered must be no higher than what it cost Phillips to produce gas in the test year of 1954.

IV. What May Happen

WHAT FPC MAY DO with Examiner Zwerdling's decision is the gas industry's favorite guessing game.

The principal pipeline and distributor intervenors in this case can be expected to fight hard for confirmation of Zwerdling's thesis that it is not difficult to determine an independent producer's cost of service and that it is quite practical to base wellhead prices on such a determination.

To get this thesis confirmed they probably will avoid haggling over details at the moment, and will not strenuously object to many of Zwerdling's rulings and calculations as to costs—even those that gave Phillips a break. Otherwise, many of them fear, the commission will conclude that cost-finding is so complicated that the whole attempt must be abandoned right now.

They will work hardest to support the three Zwerdling rulings that have the greatest effect in keeping down all producers' cost computation — that "phantom taxes" must be disallowed, that gas should bear only a small percentage of total oil-and-gas exploration costs, and that a modest rate of return is sufficient incentive for continued exploration.

Where these intervenors will direct their fire is that part of the decision that affects their own pocketbooks most—the application of the rate schedule.

This will be their idea of the proper "point of departure" from the conventional utility-regulation method.

They will insist that FPC determine all producers' costs, more or less by the methods of Zwerdling and perhaps including the company-wide determination.

But they don't want uniform, flat-rate, or postage-stamp prices. They will suggest that after determining costs for individual producers, the FPC then establish area field prices based on a combination of factors including producing costs, historical prices, market conditions, and FPC's own judgment.

Thus the final result conceivably could be something not far different from the "fair-field-price" method of regulation which producers have been advocating for years and which FPC itself tried to use before stopped by the courts.

So if you begin to suspect that the industry may eventually come out of this mess almost exactly where it went in when the Supreme Court wrote its Phillips decision in June 1954, you could be right. But there is still a long, rocky road to follow.

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TABLE 1—PACIFIC NORTHWEST PIPELINE CORP. 1958 DEHYDRATION UNIT COST, NORTHERN DIVISION OPERATIONS

Field—	No. units	Avg. daily production M.M.c.f.	No. of operating personnel	Operating cost* $/M.M.c.f.	Maintenance cost† $/M.M.c.f.	Total oper. & maint. $/M.M.c.f.	Chemical cost $/M.M.c.f. prod.	Chemical consumption lb./M.M.c.f.
Big Piney	108	110.0	13	1.83	0.67	2.50	0.646	7.65
Bar-X	9	8.0	2	6.00	0.27	6.27	1.180	17.60
Piceance Creek	14	18.0	2	3.80	0.75	4.55	1.060	15.75
	‡131	‡136.0	‡17	§2.34	§0.66	§3.00	§0.730	§9.31

*Includes field supervision, chart changing on field meters, routine unit inspection, recharging (including chemicals), and transportation. †Includes field supervision, repair parts, location upkeep, painting, and transportation. ‡Totals. §Weighted averages.

What it costs Pacific Northwest Pipeline to

Dehydrate with calcium chloride

Total operating and maintenance costs run $3 per M.M.c.f. of gas

BY E. R. MOORE AND W. G. CUTLER
Pacific Northwest Pipeline Corp.

CALCIUM CHLORIDE has been used for Pacific Northwest Pipeline Corp. in individual wellhead dehydration units to process in excess of 100 billion cubic feet of natural gas. Because of subzero and freezing-weather conditions in the Rocky Mountains, water in liquid and vapor form is removed at the individual well site before entering the gathering system to insure a continuous gas supply throughout the year.

The production areas are located in Big Piney field, Wyoming, Piceance Creek field in northern Colorado, and Bar-X field on the Colorado-Utah border. These producing fields offer a wide variance in the natural properties of produced gas. For example, in Big Piney field the wells have (1) shut-in pressures ranging from 200 to 3,000 psi., (2) low average producing temperatures, (3) distillate production from very small amounts to as high as 30 bbl. per M.M.c.f. of gas, and (4) flow rates of from 0.1 to 6 M.M.c.f. per day.

In our Piceance Creek area the wells have shut-in pressures of 700 to 800 psi., high-flowing temperatures, and generally small amounts of distillate and free water. Bar-X field is characterized by shut-in pressures of 600 to 1,200 psi., intermediate flowing temperatures, and free water and distillate. All kinds and types of dehydration equipment are used in removing water from gas in these areas; however, our company has used calcium chloride nearly exclusively in its operations.

Principles of Dehydration

Calcium chloride, either as a solid or in solution, has been used as a drying agent in the natural-gas industry for many years. Solid calcium chloride salt crystals were first used in desiccant pots to remove water from wet gas. Here dehydration was achieved by the contact of the water and salt to form a brine. In other applications, brine was put into the pipeline where the turbulent gas, further mixed with the brine, gave a reasonable dew-point depression. The brine ultimately was gathered at a central point and disposed of.

Dehydration unit . . . In 1955 experimentation began with calcium chloride as a desiccant and a dehydration unit was developed that contained a desiccant pot, or calcium chloride bed, and utilized brine in a series of trays. In this application the wet gas from the well first enters at the base of the unit into an integral-separator section. Here free liquids, water and hydrocarbons, are extracted before the gas passes upward into the tray section.

The gas flows through a series of trays where it comes in contact with brine in various degrees of salt concentration. The brine concentration increases from the bottom tray progressively upward through the five tray levels normally used. The spent brine from the bottom tray falling into the integral-separator section is dumped to a pit for disposal.

The gas, while in contact with the brine passing through the trays, has a large percentage of the water removed. From this stage, the partially dehydrated gas flows into the calcium chloride bed where the remaining water is absorbed by the calcium chloride pellets. The physical state of the calcium chloride varies in the bed section in that the lower 2 ft. of the bed is very moist and the top of the bed is generally dry. The formation of brine in the base of the bed section furnishes a continuous source of brine for the trays. The gas leaving the bed section passes from the top of the unit into the measurement

facilities and on into the gathering system

Recharging the unit . . . In operation, as the gas continues to pass through the unit the chemical bed depletes itself. Dehydration, as measured by dew-point depression, remains at a maximum until the calcium chloride in the bed section is about 75% depleted. At this point it is necessary to "recharge" the unit. In our operation we use loaders on the individual units which hoist the barrels of chemical to an opening in the top of the unit and allow the calcium chloride pellets to gravitate into the bed section. The recharge normally requires 2 to 3 bbl. of chemical, depending on the original capacity of the chemical bed and the percentage of chemical depletion.

The frequency of recharging is dependent on the flowing pressure, flowing temperature, and volume. For example, a producing well flowing at 3.5 million cubic feet per day at a temperature of 50° is recharged monthly, while a well producing from a similar formation at 100,000 cu. ft. per day would require recharging every 6 months. Since each well has its own producing characteristics, it follows that recharging must be set up on an individual well basis. Some wells require recharging as frequently as every 3 weeks, while others are recharged after periods of from 3 to 6 months. Therefore, our scheduling is determined from field experience and knowledge of the condition of the bed at last recharge.

Operating Experience

Operating and testing experience with various sized anhydrous calcium chloride pellets has established a standard pellet size that achieved minimum consumption and highest efficiency. The specifications currently in use are 1-in. maximum and ½-in. minimum individual pellets, allowing only 1% of sizes below ¼-in.

The calcium chloride is furnished in 350-lb. drums, and it is important that it be handled as carefully as possible to prevent damage to the barrel to insure that the chemical is not exposed to the atmosphere.

Unit sizing procedure . . . In Pacific's areas of operation the conventional multipoint back-pressure test is not used in sizing our equipment as it is difficult or impossible to achieve stabilized flow within a reasonable limit of time. Therefore, we use a flow test for each well using a restricted flow through a choke to atmosphere for a sufficient period of time to offset high initial production flow rates following a shut-in period. In addition to the flow test, we also compare offset production data in determining estimated producing rates at the gathering-system pressures.

The unit is then sized one-third larger to handle the initial high flow rate and provide capacity for depletion of the well into lower gathering-system pressures. It is important that flow rates be kept in the upper one-third of the range of the unit to insure proper mixing of the brine and gas within the unit. The unit manufacturer offers models which are rated at various volumes at different pressures. We select a particular unit that will meet our requirements.

Improper sizing . . . In normal operation, as the chemical is consumed the bed falls uniformly. But when a unit is operated at less than two-thirds of rated capacity, the gas fails to adequately mix with the brine in the tray section, and the majority of dehydration is accomplished in the chemical bed. Under this condition, the entire chemical bed becomes moist and the individual calcium chloride pellets are bonded together to form a solid bridge within the unit. The

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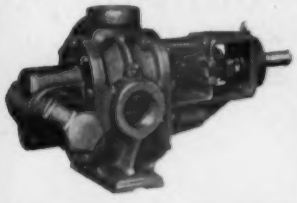

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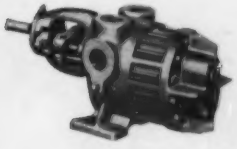
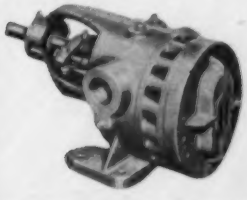
Roper Series F Pump—sizes 1 to 300 G.P.M., pressures to 300 P.S.I. Four-port design permits 8 optional piping arrangements . . . cuts installation time and costs. Equal size gears run in axial hydraulic balance. With packed box or mechanical seal; with or without relief valve.



FOR HEAVY TRANSFER

Roper Series H Pump — sizes 10 to 75 G.P.M., pressures to 1000 P.S.I. Ideally suited to those smaller diameter or long, high pressure gathering lines. Self-lubricated spur gears running in axial hydraulic balance, roller bearings and bronze wear plates contribute to efficiency and long service life. With packed box or mechanical seal.



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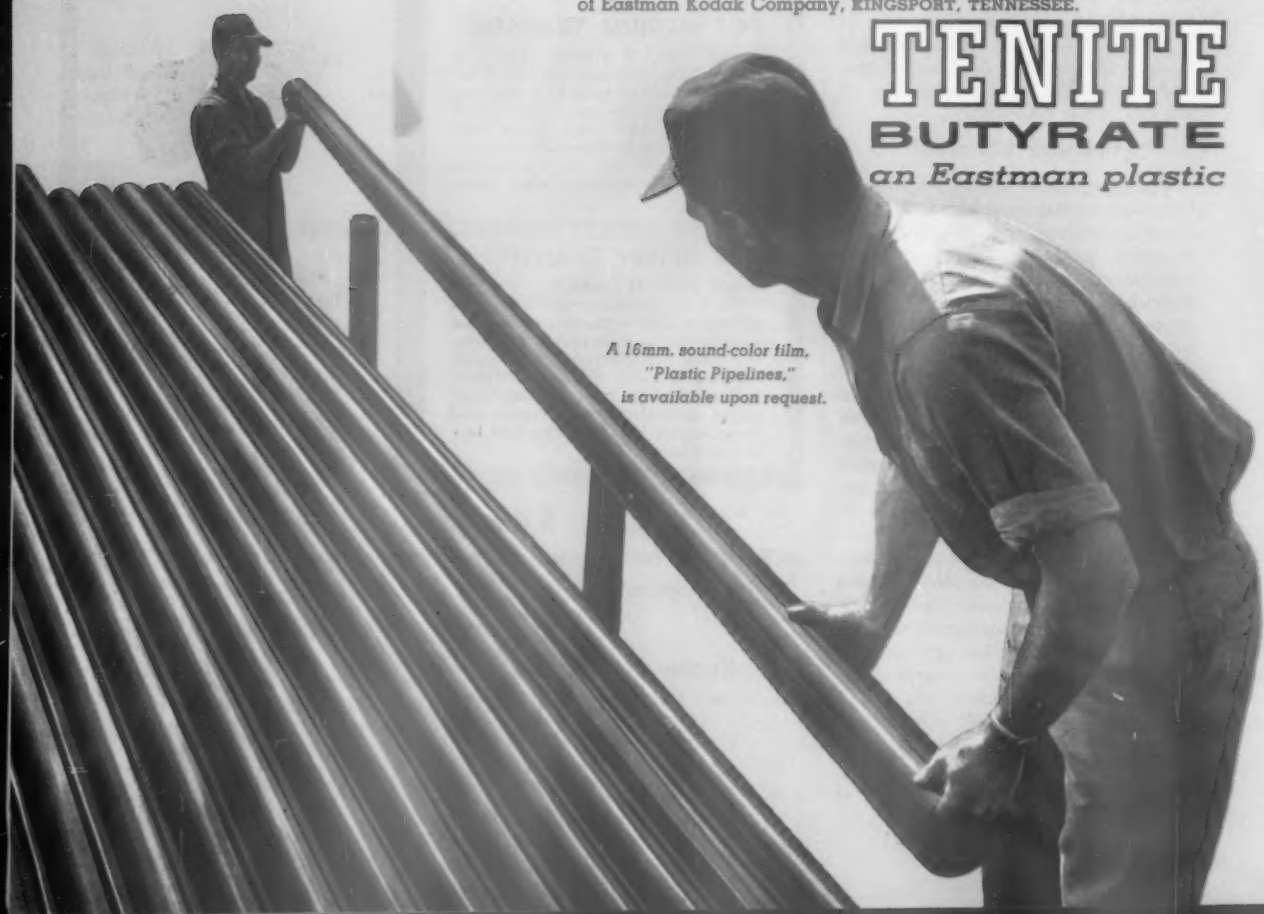

A 16mm. sound-color film, "Plastic Pipelines," is available upon request.

bridge formed adheres to the sides of the vessel and the chemical is consumed from the bottom up. This results in forming a cavity between the tray section and the suspended calcium chloride bridge.

When this condition is determined, our personnel will attempt to drop the bridge by pouring water around the outer edge of the bed and down the side of the vessel. The bridge then falls to the bottom of the bed section and the calcium chloride bed is replenished.

Channeling of the bed . . . This may result when a bridge is formed. In this case, the gas seeks the path of least resistance through the bed and consumes the calcium chloride in this path. This condition is handled in the same manner as bridging by pouring water around the vessel walls and dropping the calcium chloride to the bottom of the bed before replenishing the supply of chemical.

Bridging conditions will have very little effect on dew-point depression since the effect of the chemical bed is not altered. When channeling occurs, the dew-point depression and amount of dehydration performed become progressively less as the brine becomes water saturated. Under our recharging schedule, this is usually detected and remedied by the time effective dehydration ceases.

When units are operated above the rated capacity, the velocity of the gas through the tray section prevents the brine from falling normally to the separator section. The brine is carried into the bed section and remains suspended above the trays until the rate of gas flow is reduced. Units may be operated under this condition with adequate dew-point depression if the flow is reduced for a sufficient time each day to permit the brine to gravitate into the tray section and the excess brine removed. While adequate dehydration is accomplished, operating above capacity is not economical because of the higher rate of chemical consumption.

Cost of Dehydration

Pacific's cost of dehydration for the year 1958 has been determined by individual fields. These costs consist of operating, maintenance, and chemical expenses computed on each million cubic feet of volume handled. Table 1 lists these costs. The expenses accumulated under the heading of "Operating Costs" include field supervision, chart changing on field meters, routine unit inspection, recharging (including chemicals), and transportation expenses. Similarly, the expenses under "Maintenance" include field supervision, repair parts, location upkeep, painting, and transportation.

The factors that account for the high difference in costs between fields is directly related to the size and scope of operation and the particular field dehydration problem. Bar-X field operation requires two men and has only nine wells from which relatively small produced volumes are taken, which will account for the above-average cost. This same condition is also reflected in Piceance Creek field. Our weighted average cost for dehydration of $3.00 per M.M.c.f., or 0.3 cents per per M.c.f., will compare favorably with similar types of dehydration operations utilizd in the Rocky Mountain area.

The cost data presented in Table 1 have been secured from our company's accounting and measurement records. These costs, while representing Pacific's expenses in the areas under discussion, will not necessarily be applicable to other areas or permit comparisons with other types of equipment as they are related to particular well-producing characteristics, composition, and physical properties of natural gas and the geographical location of operations common to the three areas of Pacific's gathering.

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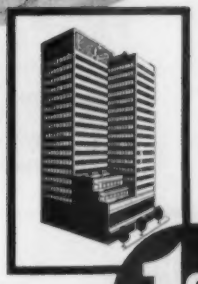

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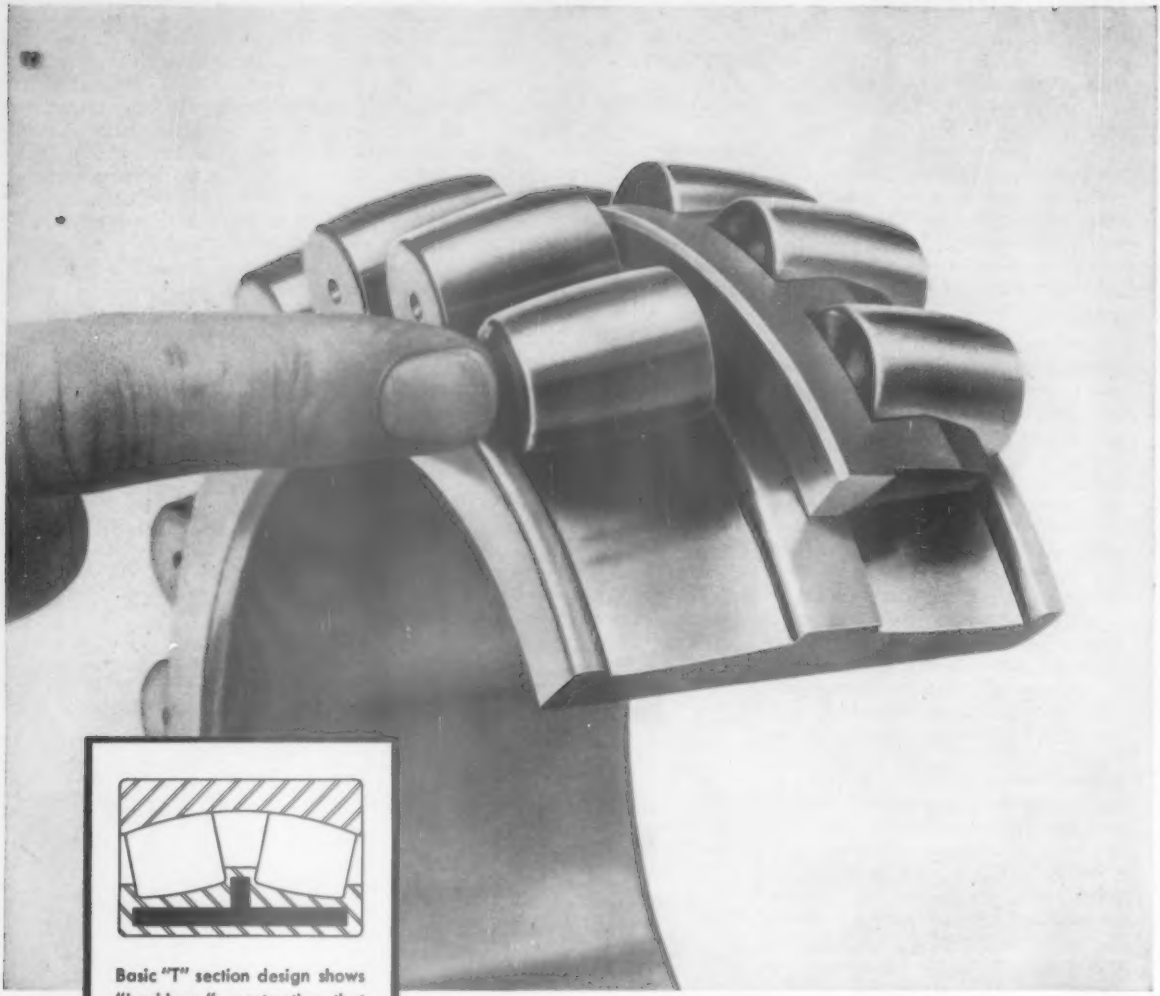

Basic "T" section design shows "backbone" construction that insures positive roller guidance and stability without skewing under all load conditions.

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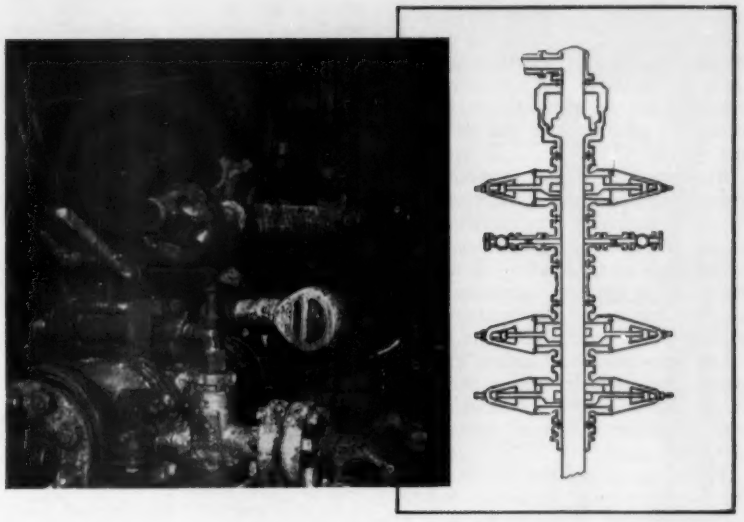


Blowout prevention

In this era of town-lot and residential drilling, blowout prevention has become a serious matter indeed. And yet, in spite of this, few operators today extend their supervision of blowout-prevention equipment past the time of actual installation on the wellhead.

By FRED L. WALKER
Walker Oilfield Equipment Co., Inc.
Los Angeles

MUCH WORK and expense are required to maintain operating efficiency of blowout-prevention equipment at its peak. Even with servicing and overhauling after each drilling operation, there is always the chance of failure just as with any piece of machinery. But by following a consistent program of checking and servicing these tools after each job, testing and replacing worn parts, chances of failure are reduced. This procedure is expensive and time consuming, involving a great deal of labor and material costs which in many cases the industry fails to realize and in many instances refuses to pay for.

Consequently, some blowout-prevention equipment used in drilling, remedial, and production work is substandard. If put to the test, it would never meet performance requirements.

If the oil industry is sincerely interested in raising the standards of blowout-prevention equipment for maximum safety and control, the situation can be rectified. However, the responsibility for adequate blowout equipment rests squarely upon the oil operators. Rigid specifications could be established. Preventers and accessory equipment such as spools, flanges, piping, valves, and fittings should be thoroughly inspected, some parts discarded, and all equipment overhauled and tested before installation on the job. Operators could require an inspection of this equipment both before and after it is assembled, and certainly before delivery to the job. They could furnish more complete supervision to follow through on the equipment until the job is actually completed. Operators could also encourage coordination among engineers, drilling foremen, contractors, and service companies, resulting in more efficient installations and eventually in more safety and protection. With the creation of such comprehensive programs on the part of oil operators with respect to the use and care of blowout-prevention equipment, adequate blowout protection could be obtained not only on paper but in actual field practice.

This article is a condensation of an address presented at the Southern California Oil Industry Safety Conference of the Western Oil and Gas Association, April 1959.

Cost thrust on contractor . . . At present, most operators require the drilling contractor to supply blowout-prevention equipment. The supplying of this equipment is usually left to the contractor. It may be his own equipment, or it may be borrowed or rented from any source he chooses.

The practice of requiring a contractor to furnish blowout-prevention equipment has created an inherently hazardous situation. In the typical drilling contract the blowout-prevention equipment is not a direct charge to the operator or even a recharge. It is a direct expense to the contractor and must be handled competitively with other contractors.

Under this arrangement the emphasis is, of necessity, shifted from one of quality to cost. The contractor, willing or not, is often forced to install inferior equipment if it can be obtained at less cost. The deceptive, and undoubtedly the most dangerous, aspect of this arrangement is that it is impossible to pinpoint the exact instant when blowout-prevention equipment ceases to be just good

enough and becomes substandard.

There are few contractors who have personnel and shop facilities for giving blowout preventers the care and attention they require to insure efficient operation. They realize that a blowout can be as disastrous to them as it might be to the operator. This situation can be attributed mainly to economic conditions in the oil industry today.

However, adequate blowout prevention equipment and safety-control measures should not be sacrificed because of economic conditions. With a thorough understanding of what is necessary to maintain maximum safety control measures, the operator can take steps to secure adequate equipment from qualified sources. The importance of rigid inspection and thorough maintenance of blowout-preventer equipment cannot be emphasized too strongly.

If you are responsible to your firm for the supervision of blowout-prevention equipment, it might be well to consider extending your supervision beyond the point of compiling specifications for installation and into the all-important area of blowout-preventer servicing and maintenance.

Start with detail specs . . . To begin with first things first, there seems to be a real need for further integration among engineering departments, company field representatives, contractors, service companies, and manufacturers. Ideally an operator would delegate responsibility and authority for blowout-prevention equipment to one individual. This man would then supervise the equipment from the time of drawing up the contract to the completion of drilling. Again ideally, this individual would consult with the manufacturers, service companies, and his own drilling department. Finally, before the drilling rig moved in, he would draw up detailed and specific requirements for installation and use of all blowout-prevention equipment. Copies of these requirements could then be given to all parties concerned and would also be posted in at least one place at the well.

Maintenance is key . . . There are many factors which determine what degree of safety and control an operator might expect from any such installation. Even more important, perhaps, than the particular design of preventer used, is the condition of whatever preventer is chosen. There are very few phases of your drilling operation where quality is so important. A blowout preventer has to work whenever it is needed and at the exact moment it is needed. When a blowout occurs, there is no time to shut down and repair faulty equipment.

The single most important item to consider is probably not what type of preventer you decide upon—but whether the equipment you have chosen has been properly maintained, serviced, and tested before installation on your job.

In this era of town-lot and residential drilling, blowout prevention has become a serious matter indeed. And yet, in spite of this, few operators today extend their supervision of blowout-prevention equipment past the time of actual installation on the wellhead. Most operators abandon adequate supervision of this equipment as soon as the plug is drilled out of the surface pipe, even though many times one or more pieces of most preventer installations become inoperable at some point during most drilling operations.

This equipment is normally subjected to extremely difficult operating conditions. Vibration of the cellar connections, for instance, can cause breaking and leaking of hydraulic control lines. The circulating of cuttings and sand through the preventer will often destroy the ability of the preventer to function adequately when needed.

Some power systems depend upon electric motors to run their pumps. Electric motors can burn out and fuses can blow out.

Some systems depend upon battery-started engines. Batteries can run down.

All hydraulic systems depend upon valves to close and open the preventers and valves can stick and freeze if not lubricated properly and frequently.

There are a great many different things that can happen to the simplest

preventer during a drilling job. But because of present supervision practices, most preventers would be an unknown quantity if a blowout did occur. This, too, might be a fruitful area for investigation if you are responsible for your company's blowout-prevention equipment.

Acquaint men with ratings . . . There are many types and sizes of blowout preventers on the market today. These vary not only in size but also in pressure rating. A brief review of these ratings might be helpful at this time.

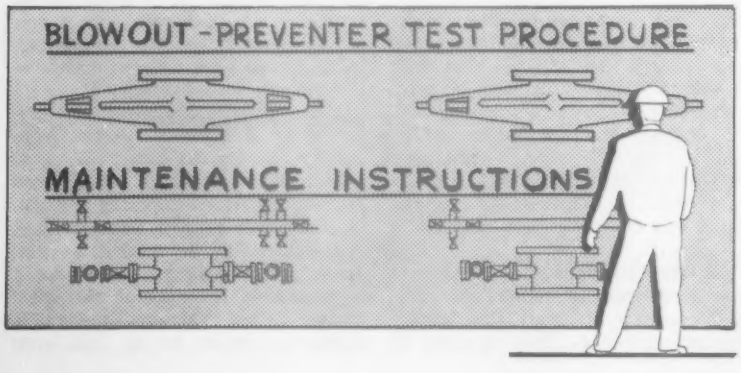
Gates are rated in accordance with the API nomenclature in terms of series numbers. The series number does not denote size. It denotes test pressure and working pressure. For instance, the 400 series are rated at 1,920 psi. test pressure and 960 psi. working pressure; the 900 series are rated at 6,000 psi. test pressure and 3,000 psi. working pressure; the 1,500 series are rated at 10,000 psi. test pressure and 5,000 psi. working pressure; and so on.

Preventers have built into them flanges, usually top and bottom, which conform to the gate-pressure rating and these flanges are also denoted by the usual API nomenclature in terms of series.

There must be confusion in the minds of some regarding the API series numbers. Foremen sometimes refer to flanges and spool sizes merely by the series numbers, thinking that this also describes the size.

Nominal sizes are made in all the various series from zero to 20 in. and more. The size figure for flanges is usually in round numbers called the nominal size of the flange and is so determined by the maximum pipe recommended by the API which can be accommodated by the flange without interference with the gasket ring groove.

So, in order to describe a particu-



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THOMPSON SAND RESISTANT OIL WELL PUMPS

TRAVELING PLUNGER ROD TYPE BOTTOM HOLD-DOWN PUMP
STANDARD SIZE
Figs. 400P, 600P, 700P, 800P

Single or double, self-aligning, combination cup and plunger or all-metal traveling plunger type pumps made in four sizes: regular 1½", 1⅝" oversize, 2" regular and 2⅛" oversize bore. These pumps seat in API seating device. In very sandy wells, or when tubing is out, we recommend our SAND HOUSING MECHANICAL SEATING SHOE, which prevents sanding in of pumps as sand can be dumped and the pump pulled at any time by our sand flushing arrangement.

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Standard Size
Figs. 400T, 500T

Self-aligning double plunger insert pumps. Made in three types: combination cup and single plunger; combination cup and double self-aligning type; and metal-to-metal double plunger self-aligning type. All are equipped with Regular or Extra Long Alloy Plungers, ground individually to fit the barrels, assuring longer life on both pump and surface equipment.

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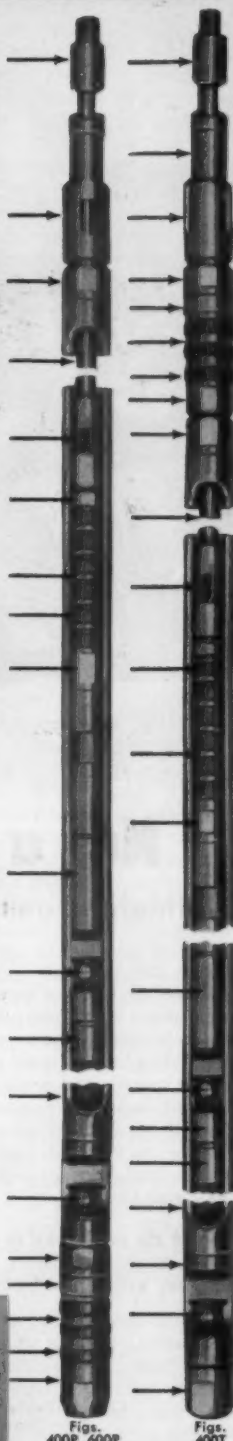

Figs. 400P, 600P, 700P, 800P

Figs. 400T 500T

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Correct alignment over a hole is never a problem when you have a Bethlehem pumping unit on the job. Critical align points are center punchmarked so that accurate line-of-sight placement of any Bethlehem unit can be made quickly and easily.

And top-quality construction—a tradition maintained in all Bethlehem products throughout every change to better design—assures every producer that his Bethlehem units will hold their alignment, year in and year out.

What do you need in a pumping unit? Bethlehem units range in capacity from 6,000 to 640,000 in.-lb torque; will handle polished-rod loads from 2,000 to 33,000 lb. Strokes range from 16 up to 168 in. And every unit features these advantages:

- **Portability, if desired.**
- **Elevated motor power assembly.**
- **Hydraulically removable wrist pin, with self-aligning spherical roller bearings.**
- **Full roller-bearing gear reducer with forged-steel gears; flood lubrication; settling chamber.**
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BETHLEHEM STEEL • SUPPLY DIVISION

lar API flange, it is necessary to specify both its nominal size number and also its series number, such as nominal 6 series 900 or nominal 12 series 900. Neither a nominal number nor a series number alone will suffice to describe a particular flange. An understanding of this API system is very important in setting up proper specifications for a job and also in expediting the operation efficiency.

Better equipment today . . . In recent years there have been new developments in control heads. In most major operations a combination of both the double-ram type and bag packer, hydraulically operated, has replaced the old-style mechanically operated gate-and-bladder-type control head. The latter combination is too slow to operate, especially if a well makes a sudden blow.

The common installation of controls for this old-style equipment consisted of hand wheels or hand-operated pump at the edge of the derrick subbase. This proximity of the controls to the wellhead and the length of time to effect a closure with them would cause some crews to run for safety, letting the well blow. They knew that by the time they closed the rams or pumped the bladder packer closed, the head would probably be cut out from sand and rock or that they could be engulfed in flames.

Improvements in this equipment were made by hooking an air motor to the ram screws of the mechanical gate and operating the bladder packer with nitrogen bottles or the mud pump. In this case the controls were set at a reasonable distance from the wellhead and a little safer margin of control was effected.

The weak point in this combination is the bladder-type control head which not only is designed to hold the well pressure but the packer itself must also be capable of holding the operating pressure to effect a closure. Theoretically, this design is all right but in actual practice misfortunes happen in the process of drilling whereby the packer can become damaged unknowingly with tools passing through it. As a result, when emergencies arise, there is no control.

". . . when the bladder-type packer ruptures, there is no control."

Another feature of the bladder-type control head is its unpredictable nature as to when it will rupture due to age or number of times it has previously been closed. This can be disastrous in an emergency and very serious if the tool is being used for squeezing, back scuttling, sand fracturing, or displacement operations. Precautions are usually taken before such operations to see that the tool will function satisfactorily. However, it may be on the next closure or during a critical operation that the bladder will rupture.

There is no gradual indication of this malfunction. It is like a tire; when the tube blows, it happens instantly. Likewise, when the bladder-type packer ruptures there is no control, and considerable damage, delay, and costly expense can occur.

Air motors on old preventers . . . Referring again to the mechanical ram-type preventer, there are still several features about this tool which make it very desirable as a piece of control equipment. Over the years many improvements have been made which make it operate more efficiently and with greater safety of control.

The body has been redesigned with deep recesses to facilitate draining and also to enable the inside body to be flushed free of foreign material deposited by the circulating fluids. Rams and ram carriages are now designed to close more easily and the rams are designed to center themselves around the pipe. Better gland and face packing and API flange connections are all features which have been incorporated in the later-type mechanical gates.

However, the trend has been away from this piece of control equipment, especially on the new drilling operations and where unknown pressures might be encountered in redrilling operations. The reason for this, no doubt, is the difficulty of making a quick closure especially where the operation is dependent on the crew to turn the ram screws by hand.

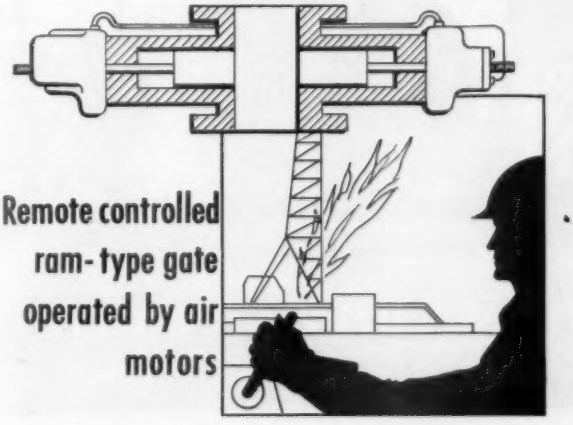
However, this same piece of control equipment can be made very efficient and almost as effective as the late-style hydraulically operated gates by using an air motor to close the ram blocks. By hooking up controls to the air system at strategic points and insuring plenty of reserve air supply, a mechanical ram-type gate can become one of the most efficient safety measures for drilling and remedial operations.

Best needs care, too . . . This brings us to a discussion of the automatic hydraulically operated blowout-preventer hookup which usually consists of a double ram-type preventer and a bag packer control head. These are both operated from a central power plant which maintains a constant pressure of 1,500 psi. on the lines.

It requires pressure to both open and close these heads. The power plant accumulates this pressure constantly through pumps which are operated by either an electric motor or gasoline engine. These turn on and off automatically by means of a pressure regulator switch through a range of 150 psi., starting up at 1,350 psi., and cutting out at 1,500 psi.

With this type of equipment, several innovations as to controls can be used. One set of controls may be used and might be located at the end of the pipe rack, perhaps 80 to 100 ft. from the wellhead. Or a set of controls may be used on the derrick floor at the side of the driller for easy reach. In many cases both sets of controls may be used and hooked up in such manner that either can be used depending upon which is within reach and safest at the time of emergency.

This type of wellhead control is by far the safest blowout-preventer equipment available. But, like any other piece of equipment, the more automatic it becomes, the more care and attention it requires to maintain it in proper operating condition.



Remote controlled ram-type gate operated by air motors

From the wellhead through the refinery gate BRIDGEPORT TUBES HELP CARRY THE LOAD

Right from the wellhead—Bridgeport is in the oil and gas production picture with aluminum, brass and copper base alloys in corrosion-resistant, single-wall and duplex tubes.

In natural gas production, for example, air-cooled heat exchangers at the wellhead do an around-the-clock job in both radiating the heat from the compressor engine and cooling the compressed gas before it is sent on its way to the gathering stations.

The air cooler illustrated here is manufactured by Air-X-Changers, Inc., Tulsa, Oklahoma. This model uses aluminum fins on Bridgeport Arsenical Admiralty condenser tubes. The tube bundles are mounted in a chamber, and fan-blown air across the finned surface cools either the compressor engine jacket water or the interstage and after-stage compressed gas. Bridgeport Inhibited Admiralty tubes are generally preferred for this type of service because of their corrosion resistance to both water and gas. And Bridgeport Aluminum Fin Stock is specially engineered for applications like this.

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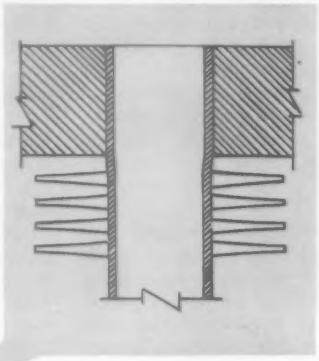
Cross section of Air-X-Changer tube shows it expanded into tube sheet and individual aluminum fins positioned.



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Digital computer makes refining largely predictable for Tidewater

. . . Next step: designing a set of interlocking programs to serve as a dynamic model of total integrated operation

BY H. F. LINDSAY AND R. H. WULZEN
Tidewater Oil Co.

ELECTRONIC COMPUTER programs for rapid calculation of refinery yields and profits on a medium-sized computer have been developed for each of the two Tidewater Oil Co. refineries. The results have been rewarding. To a large degree, refining has been established as a readily predictable operation. Much of the uncertainty in problems involving refining has been eliminated. And we believe that we have a valid approach toward solution of the larger problem, that of optimizing the over-all operation of an integrated oil company.

The Specific Problem

The problem as it applies to the Avon refinery is complex, due to the large number of units (operating or contemplated), each of which may be considered a potential bottleneck under certain conditions of crude-oil input or product demand. This necessitates devising alternate methods of operation for all possible conditions that have a reasonable likelihood of occurring. One condition that appears likely is the charging of higher-sulfur crude oils in the future. Consequently, it is desirable to calculate the weight per cent sulfur content of all products, as well as their specific gravity and other properties that might be critical in meeting specifications.

The Computer . . . The electronic calculator chosen for this job was the basic IBM 650 machine, an all-purpose, medium-sized* computer with magnetic-drum-type memory capacity of 2,000 10-digit decimal numbers.

The main processing units in the refinery are assumed to operate in the manner for which they were designed, that is, to maximize the production of gasoline at the expense of fuel oil, consistent with the demand for middle-of-the-barrel products and other limitations. For example, the catalytic cracking unit is assumed to operate at maximum coke-burning capacity on the feed stock available after satisfying the demand for diesel fuel and heating oils. If the unit is not filled up with fresh feed, catalytic gas oil will be recycled to the maximum feed rate permissible. Under a given set of conditions, if a refinery surplus of gasoline results, a lower-grade, lower-cost crude will be substituted which just satisfies the gasoline demand.

A high degree of accuracy is required in predicting yields from the major processing units to arrive at a realistic refinery margin of profit on individual crudes, since the margin is a difference figure representing a small percentage of the total value of the products.

The program takes advantage of the best available crude-analysis data, commercial experience on refinery units, and particularly pilot-plant data on feed stocks from individual crude oils.

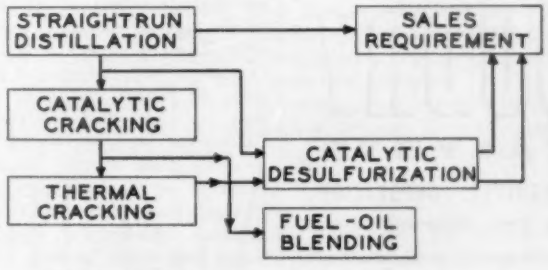
A Case Study

In preparing a case study for machine calculation, a number of premises must be fixed, including the following:

1. Volume of each crude oil or other raw material charged, and point of entry to the refinery.
2. Sales requirement of all products except motor gasoline and heavy fuel oil.
3. Equipment capacity limitations on all units included in the model. Zero capacity is used to exclude a unit from consideration.
4. Specifications of finished products which are likely to become critical.
5. Economic variables including cost of raw materials, value of finished products and constants for operating cost formulas of all operating units.

Straightrun calculations . . . Up to 50 crude oils or other sources of raw material may be considered at one time. Cards representing the amounts and properties of each crude oil in the proposed slate, based on crude-oil analyses, are selected and loaded into the computer. The computer then executes the program instructions, automatically c a l c u l a t i n g preliminary straightrun yields from each crude oil. The composite yields from each processing unit are punched out. Crude oil may be charged to four units, i.e., light-crude stills, heavy-crude stills, vacuum-flash unit, and the fluid coker. Heavy crude oils may be charged to the vacuum-flash unit if capacity is available after processing light residuum from the light-crude stills. However, if insufficient capacity exists, the program diverts them to the fluid-coking unit.

The straightrun products are considered intermediates for blending or further processing. Each product is classified according to its properties. Gasolines and kerosines are divided



DISPOSITION of light-gas-oil fractions. Fig. 1.

Paper presented at the Fifth World Petroleum Congress, New York.

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That's why refiners who are using the simple, flexible HOUDRIFORMING and ISO-PLUS HOUDRIFORMING processes can look forward to profitable high octane gasoline production for a long time to come.

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into six categories of ascending naphthene content. Diesel fractions, light gas oils, and vacuum gas oils are stored in six groups lined up in ascending order of sulfur content. Vacuum and other gas oils to be charged to catalytic cracking are segregated in groups according to yield data determined in the catalytic cracking pilot plant. Heavy bottoms are divided into four categories of fluid coker or visbreaker charge stocks.

Stock balancing and processing . . . The second phase of the computer program contains a great number of logical decisions affecting the disposition of intermediate products, both from straightrun units and from subsequent processing steps.

Many of the processing units are interdependents, that is, the feed to one unit may not be known until the yields from another unit are established, and vice versa.

Consider the disposition of light gas oil fractions shown in Fig. 1. Virgin light gas oil may be charged to catalytic cracking or catalytic desulfurization. Also, catalytic gas oil may go to thermal cracking or desulfurization or fuel blending. A direct solution is not obvious. However, the sales requirement, plus the sulfur specification and the availability of straightrun material, can be used to establish the flow, if any, to the catalytic cracker and/or desulfurizer, and the problem is greatly simplified. The assumption is made that, if the sulfur specification is exceeded, selected high-sulfur straightrun stocks will be hydrodesulfurized. If there is a deficiency in volume, cracked stocks will be hydrodesulfurized to make up the deficiency. In some cases, both operations will be required. The program must have alternate courses of action to cover every possible set of conditions, to be fully automatic. On some combinations of units it is necessary to use a trial-and-error approach. The latter type of calculation was used for recycle-extraction-reforming and for thermal cracking and fuel-oil blending.

The calculation of yields from some units is done in a more elaborate manner than on others, depending mainly on the type of basic information available. The fluid-coker model is based on design information and pilot-plant data. At present, we have additional data on hand and are revising the fluid-coker program somewhat. This is easily done without disturbing the sequence of the main program.

Yields from each process unit are machine checked to insure 100% weight and sulfur balance. Volumetric yields include a difference figure which represents either a loss or gain in barrels.

The charge to the fluid catalytic cracking plant consists of light virgin gas oil, heavy virgin gas oil, visbreaker gas oil, light-coker gas oil, heavy-coker gas oil, and recycle catalytic gas oil, usually in the order of preference listed. The computed program fills up the unit to its feed rate capacity in this manner and routes excess stocks to thermal cracking or other processing. Then, by trial and error, it determines the maximum severity of operation on the selected feed stocks within the coke-burning limitation of the regenerator. All feed stocks are assumed to be cracked at the same average severity of operation. A deck of yield cards is provided for each severity level as selected by the computer. This method of calculation gives excellent approximations to commercial operations on the Avon fluid cracking unit.

Alkylation-plant olefin feeds consist of available butylenes from cracking and coking operations supplemented with propylene, if required. Isobutane is supplied by the isomerization units; however, if insufficient isobutane and normal butane are available in refinery streams, the amount of these stocks to be purchased is calculated. Two grades of aviation gasolines are blended from alkylate and other stocks available to meet Reid vapor pressure, F4 rich-mixture rating, and other specifications. Grade 115/145 aviation gasoline may be maximized or made to meet a specified volume, as desired.

Thermal cracking and utilities . . . The third major phase of the simulation program is concerned with balancing thermal cracking operations and summing up fuel requirements and usage of steam and electricity. Refinery fuel consists of process gas, excess propane, fluid coke which is burned in the coker, and one of the boiler plants, heavy pitch fuel and No. 6 fuel. A trial calculation is made to determine whether the volume of cutter stock produced is enough for blending purposes in refinery fuel plus three grades of heavy fuel available for sale. If the cutter stock is not in balance, thermal cracking will be repeated with the feed rate adjusted until an approximate balance results. In certain cases a shortage of cracking capacity may result in an excess of cutter stock.

At the conclusion of the process calculations as outlined above, yields of final products and all major processing units have been punched out. The calculations may be stopped here if an economic evaluation is not required.

Economics . . . The fourth phase of the program evaluates the economic factors for the processing calculations made in the first three phases. The fourth phase can be run independently to enable a variety of economic factors to be studied on a single process study. A listing of the cards punched in this section shows the value of all raw materials and final products, the operating cost of each unit, the fuel, steam and electricity used, and the net refinery earnings.

Use of the Program

The simulation program has been applied to a wide variety of problems, both by itself and in conjunction with other electronic-computer programs. It has been used:

1. To evaluate individual crude oils or crude oil mixes.
2. For short and long range planning of refinery operations.
3. For projecting the economic benefits of investments in new refinery process units.
4. For optimization studies of companywide operations.

In the latter type of study it has been coupled with a similar program written for the Delaware refinery. This is done by using the output of both simulation programs as input to a standard linear programing procedure designed to evaluate the effects of the variables involved in integrating production, transportation, manufacturing, and marketing.

Crude-oil evaluation . . . The refinery simulation program enables an evaluation of an individual crude or a crude oil mix by calculating the incremental effect of varying the amount of this material in a given slate of crudes. In this way the contribution of the individual crude to total refinery profit can be determined. The computer program automatically observes all processing-unit bottlenecks and other limitations, including the natural internal balance between deficient and excessive product yields of the various crudes. Programs for both refineries provide for the evaluation of crudes through close approximation of refining and marketing premises. For example, the latest laboratory analyses are used for crude-oil data. Forecasted product sales quotas can be observed. Forecasted product realizations and operating expenses are applied in computing total profit. Other factors such as distress prices for products made in excess of sales quotas can be applied where appropriate. The final result is in the form of a net profit or loss for running any slate under the premises used. Consequently, the profit or loss

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"Second phase of program affects disposition of intermediates."

for a barrel of any crude can be measured easily by calculating the difference between profit of the scheduled slate and a slate containing the subject crude.

The refining value of each crude is expressed in terms of profit per barrel of that crude under the stated conditions, which may represent actual or theoretical conditions. Generally, forecasted conditions are used, and the crude value may be expressed either as a "constant crude margin" or a "constant gasoline margin."

Crude margins . . . For the purpose described, a crude margin has been defined as the average profit per barrel of a particular crude oil when used as a component of a predetermined crude slate under forecasted conditions. The same term also applies to the average profit per barrel of a mixed crude slate.

Constant crude margin has been defined as the average profit per barrel of subject crude obtained by using 85% of the budget crude slate and an amount of subject crude equal to 15% of the budget slate (i.e., 15% of the budget slate is replaced barrel-for-barrel by an equal quantity of the crude being evaluated). The constant crude margin is calculated by the equations below.

Constant gasoline margin . . . This is the average profit per barrel of subject crude obtained by using 85% of the budget crude slate and whatever amount of subject crude is needed to make the same motor-gasoline volume as the original budget slate (i.e., 15% of the budget slate is replaced by a variable quantity of subject crude depending on its gasoline yield). Products with normal production quotas are held constant. Excess heavy fuel oil or cutter stock over the sales forecast is given a distress value. The constant gasoline margin of the subject crude is then calculated by the equation given for constant crude margins.

The main difference between the two types of margin is that constant crude margins are always computed at the same throughput level with the same distribution of fixed costs, while the constant gasoline margins are computed at variable crude throughput levels giving an incremental effect because of the distribution of fixed costs over a variable volume.

Interpretation of crude margins . . . A table of crude-margin evaluations is published at frequent intervals as a guide to those concerned with crude-oil supply. Constant crude margins are generally used for this purpose since they maximize gasoline production and permit a barrel-for-barrel substitution of one crude for another without upsetting the internal refinery balance. Constant gasoline margins are useful in selecting small volumes of crude during periods when gasoline production is to be held constant. As a rule, both types of margin have been found to be quite reliable over the range of variations normally encountered with a forecasted crude slate.

Production forecasts . . . The features described for crude-margin evaluations are provided also, to the extent required, in refinery production forecasts and operating budgets. Forecasts are made for periods varying from 1 month up to 5 years. Budgets based on the forecasts are computed annually and revised quarterly. A three-man group in the refinery operating department is able to make all forecasts, budgets, and crude-margin evaluations and revise them promptly when economic conditions or crude availabilities change.

Case studies . . . Many special case studies have been made to evaluate the effects of adopting alternate processing schemes, installing new process units, or enlarging existing equipment. Many other case studies have been made involving proposed changes in marketing policies, crude-delivery schedules, and interrefinery transfers of crudes and unfinished products. For most purposes the accuracy and reliability of the computer program are limited only by that of input data.

Optimization studies . . . The critical nature of product quotas and other sensitive factors, and the need to find the most profitable balance between crude volumes and costs and product quotas and realizations, has led to the use of "optimization programs" and other special case-study methods for analysis of special situations. Several types of programs are now available or under development by Tidewater which have been designed especially for optimization studies. In their more complex form, such programs can be used to find the most profitable manner of operating a so-called economic unit consisting of two refineries, the tanker fleet, crude-oil production operations, and marketing operations. Experimental analyses of this kind have been made on an extensive scale.

Optimization programs have also been used as subroutines in the gasoline-blending section of the refinery-simulation program. These subroutines are in the form of standard linear programing procedures. They have the ability to reduce tetraethyl lead usage, reduce quality giveaway, stabilize the inventory of blending stocks, and assure full compliance with quality specifications. These programs can also be used independently for monthly or quarterly blending forecasts and for research studies involving changes in quality specifications, reformer severity, characteristics of blending stocks or seasonal inventory levels.

$$\text{Subject crude margin} = \frac{\text{New slate profit—85\% (budget slate profit)}}{\text{Volume of subject crude added}}$$

Example:

a. Budget crude slate	30,000,000 bbl.
b. Budget slate profit	$ 7,500,000
c. Budget slate margin (b ÷ a)	$ 0.25/bbl.
d. Budget mix in new slate (85% of a)	25,500,000 bbl.
e. Subject crude in new slate (15% of a)	4,500,000 bbl.
f. New crude slate (d + e)	30,000,000 bbl.
g. New slate profit	$ 6,825,000
h. New slate margin (g ÷ f)	$ 0.2275/bbl.
i. Subject crude margin:	

$$= \frac{\$6{,}825{,}000 - 0.85\ (\$7{,}500{,}000)}{4{,}500{,}000}$$

$$= \frac{\$6{,}825{,}000 - \$6{,}375{,}000}{4{,}500{,}000}$$

$$= \frac{\$450{,}000}{4{,}500{,}000}$$

$$= \$0.10/\text{bbl.}$$

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Blending to vapor pressure

BY W. L. NELSON
Technical Editor and Petroleum Consultant

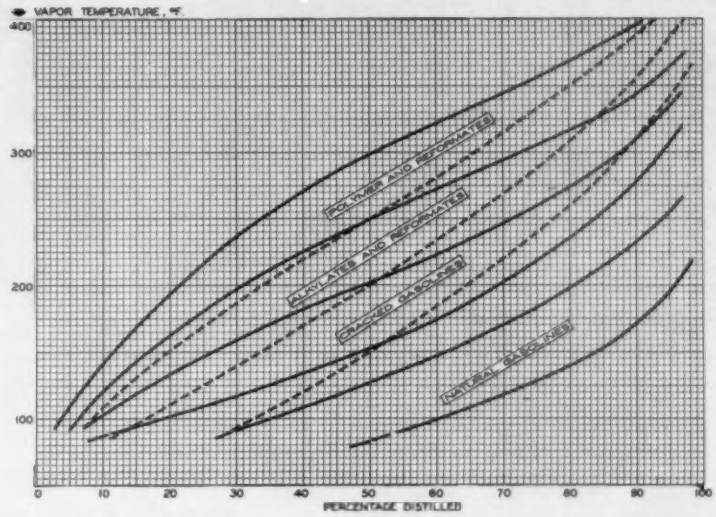
We note such rules as 1% butanes increases vapor pressure by 1 lb. in your Petroleum Refinery Engineering but this is at variance with some other blending formulas. Can you give us more detailed information? S. Wm. F.

Such rule-of-thumb methods as the 1% rule are obviously approximate because of the many variables such as (1) boiling-range distribution in the base gasoline, and (2) the vapor pressure of the butanes used in the blending.

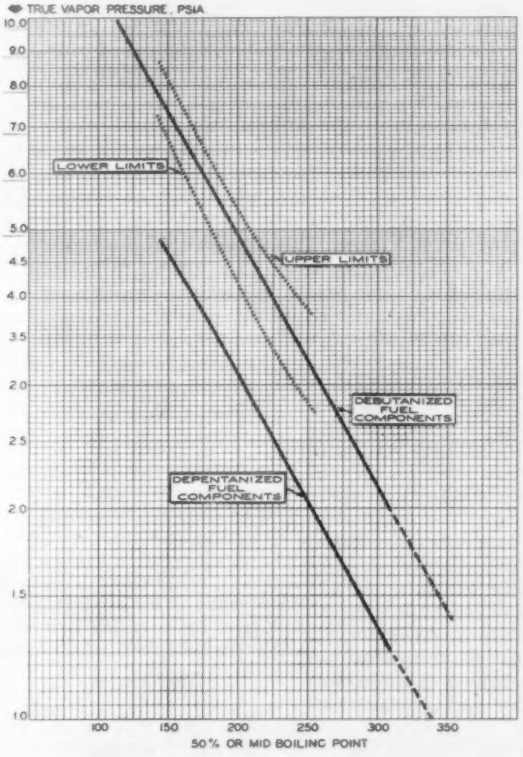
However, note the 45° lines of Fig. 3 which show that 1% butanes increases the vapor pressure by somewhat less than 1 lb. (0.68 to 0.87 lb.).

In addition, Fig. 3 is based on a butanes mixture that has a vapor pressure of 62 psia. and since the vapor pressure of mixtures range from about 56 (20% iso, 80% normal) to as high as 66 psia. for mixtures rich in isobutane as well as rich in butylenes, and hence the lines of Fig. 3 can be either slightly steeper or slightly flatter depending on the kind of B-B cut employed.

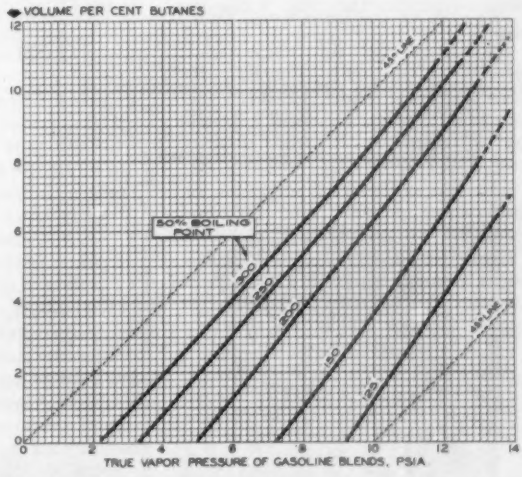
Much of the confusion that is evident in the literature also arises because of the wide range of base



TRUE-BOILING-POINT ranges for typical debutanized fuel components. Fig. 1.



VAPOR PRESSURES of fuel base stocks as a function of midboiling point. Fig. 2.



VOLUMETRIC PERCENTAGES of butanes needed in attaining various vapor pressures of blended gasoline. Fig. 3.

QUESTIONS ON TECHNOLOGY

(Continued)

fuels that are blended. Accordingly, Figs. 1 and 2 were prepared in an effort to define the effect of kind of base fuel. Polymers and reformates from high-boiling feeds usually have the highest boiling range (see Fig. 1) whereas natural gasolines constitute the other extreme base materials that may contain scarcely any material boiling as high as 300° F.

Alkylates and reformates have fairly high boiling ranges and cracked gasolines often contain very large amounts of pentanes and hexanes which cause them to have a low boiling range. The dashed lines of Fig. 1 are most representative of straightrun and cracked gasolines.

The true-boiling-point curves of Fig. 1 were analyzed for vapor pressure as shown in Fig. 2. The range indicated for debutanized gasolines by dashed lines is due primarily to variations in the boiling ranges of materials having the same midboiling point. The vapor pressures of debutanized base stocks are not as much lower than those of debutanized stocks as one might expect but such a relationship is supported by scant data in the literature on tetramer and on heavy alkylates.

In estimating the amount of butanes needed to attain a particular vapor pressure, the procedure would be to examine Fig. 1 and then proceed to Fig. 2 to estimate the vapor pressure of the base stock. Computations can then be made using the vapor pressure of the butanes actually available, or if such information is not available, then Fig. 3 can be used.

No correction for Reid vapor pressure as against true vapor pressure was made herein. However, the use of Reid vapor pressures throughout all operations scarcely changes the final proportions required because the corrections for Reid to true vapor pressure tend to compensate for one another.

Most frequently a final blend having a vapor pressure of 10 R.v.p. is desired. The amounts of butanes required for such a blend are about:

Mid B.P. of base stock	Vol. % butanes
115	none
125	1.25
150	3.6
175	5.2
200	6.3
250	7.65
300	8.55
350	9.4

RESERVOIR Engineering

12. How to determine effective permeability

(b) From field data in a gas reservoir

BY E. T. GUERRERO
Head, Department of Petroleum Production Engineering, University of Tulsa,
and
F. M. STEWART
Petroleum Engineer, Continental Illinois National Bank & Trust Co., Chicago

GIVEN: The production from a gas well was stabilized at 2,000 M.c.f. (Q_g) per day (standard conditions of 60° F. and 14.7 psia.) and the following data obtained:

Viscosity of gas (μ_g) at reservoir conditions = 0.02 cp.

Reservoir temperature, T_r = 120° F. = 580° R.

Gas compressibility factor, Z_m = 0.95.

Well spacing, 160 acres on a radius of external drainage, r_e of 2,640 ft.

Radius of well, r_w = 3 in.

Net sand thickness, h = 35 ft.

Static bottom-hole pressure, p_e = 975 psia.

Flowing sand face pressure, p_w = 185 psia.

Atmospheric pressure, P_a = 14.7 psia.

FIND: Effective permeability to gas (k_g).

METHOD OF SOLUTION: Work by Aronofsky and Jenkins[1] and also by Tracy has led to the equation:

$$Q_g = \frac{0.01032\ h\ k_g\ (p_e^2 - p_w^2)}{P_a\ \mu_g\ T_r\ Z_m \ln \dfrac{0.472\ r_e}{r_w}} \quad (1)$$

SOLUTION:

$$2{,}000 = \frac{(0.01032)\ (35)\ k_g\ [(975)^2 - (185)^2]}{(14.7)\ (0.02)\ (580)\ (0.95) \ln \dfrac{0.472 \times 2{,}640}{0.25}}$$

Where:

$$r_e = [(160\text{ ac.})\ (43{,}560\text{ ft.}^2/\text{ac.})]^{1/2} = 2{,}640\text{ ft.}$$

Then:

$$k_g = \frac{(14.7)\ (2{,}000)\ (0.02)\ (580)\ (0.95) \ln 4{,}980}{(0.01032)\ (35)\ (950{,}000 - 34{,}200)} = 8.3\text{ md.}$$

DISCUSSION: Equation 1 is the steady-state equation for radial flow of a compressible fluid modified for deviation of an actual gas from ideal behavior. It also includes a modification of the customary use and determination of r_e.

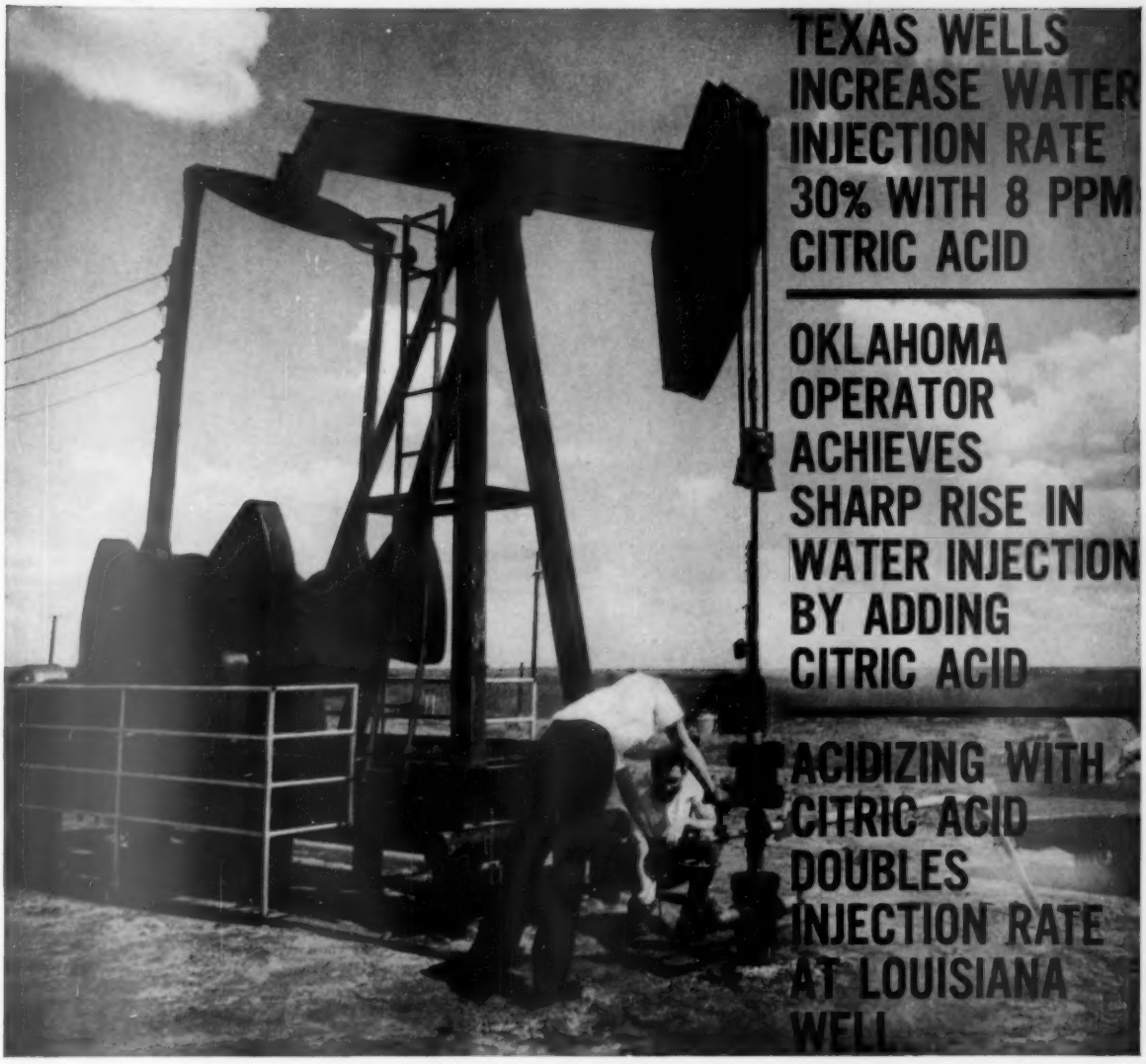
General practice has been to use one-half the distance from the producing well to the adjacent wells as r_e. However, laboratory-model studies, performed by Aronofsky and Jenkins showed that a truer value was about one-half of the assumed distance. Tracy[2] later modified this to 0.472 r_e which is the value shown in Equation 1. Actually r_e is not too critical because the log treatment reduces the magnitude of any error involved. Neglecting the 0.472 factor in the example problem would result in an answer of 9.1 md.

This problem is an example of the measurement of the effective gas permeability of the rock in place. If care is taken to stabilize the flow, the value obtained is indicative of the ability of the rock to flow gas under the existing conditions of saturation and of the sand face.

In this type of test the permeability of the rock near the well bore has a large influence on the over-all value. Consequently if the sand face is badly plugged the resulting over-all permeability will be considerably reduced.

References

1. Aronofsky, J. S., and Jenkins, R., "Nonsteady Radial Flow of Gas Through Porous Media," Proceedings of Fifth Oil-Recovery Conference, TPRC, pp. 125-135.
2. Tracy, G. W., "Diagnosing Productivity Problems in Gas Wells," presented at Ninth Oil-Recovery Conference, TPRC.



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ACIDIZING WITH CITRIC ACID DOUBLES INJECTION RATE AT LOUISIANA WELL

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A well in Oklahoma was experiencing lowered injection rates because of iron plugged sandface. The well was acidized with a solution of 260 pounds of citric acid, 25 gallons of Triton* X-100, 250 gallons of 15% HCl and 500 gallons of water. This treatment dissolved and sequestered iron responsible for plugging. Injection rate rose from 50 bbl water per day to 400 bbl per day at considerably reduced pressures.

A water flood operation in Southern Louisiana had such a concentration of iron precipitates that they could not, economically, be kept in solution. Two wells were treated with two 400 pound batches of citric acid each, two weeks apart. Combined injection rates more than doubled, from 4,000 to more than 8,500 barrels per day, at last report. Also, the injection pressure has averaged 300 psi lower than previous requirements. These results were better than any previously obtained with hydrochloric acid treatments.

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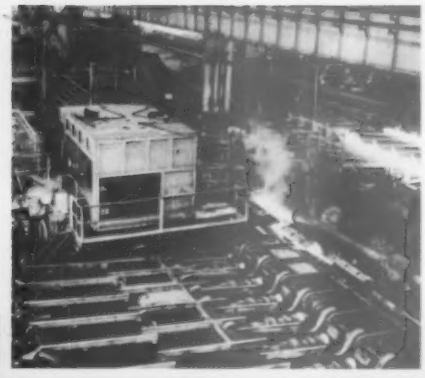

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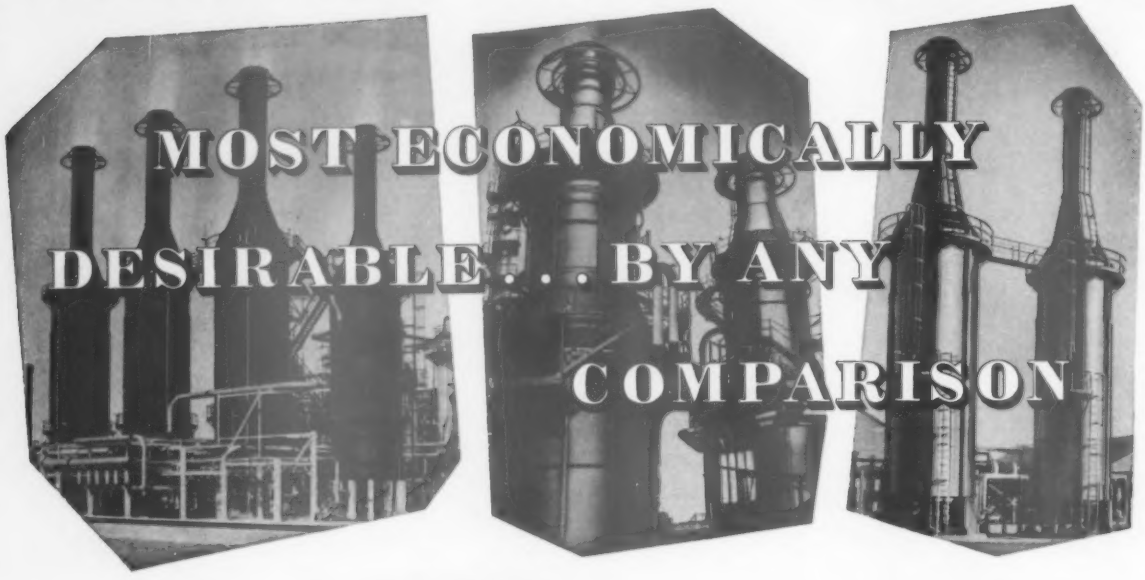

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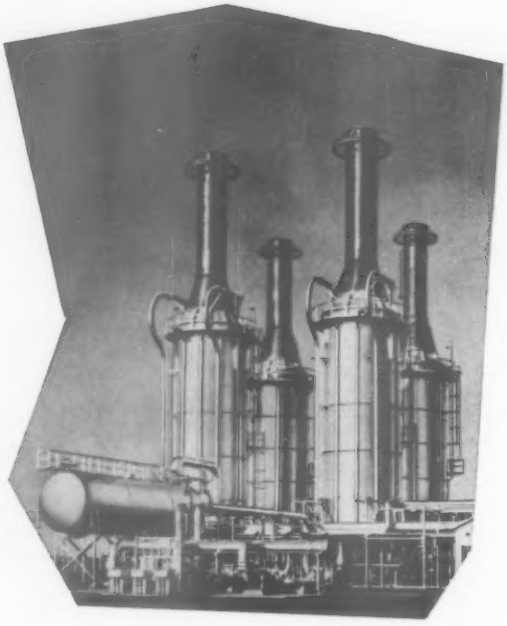

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The FOREMAN'S PAGE

Here are

A, B, C's of plant safety

PLANT facilities may often include a water-disengaging drum with a vapor release to the flare stack or to the air. This drum receives the effluent water from condensers and coolers in light-hydrocarbon service when the water pressure in the exchangers is lower than the hydrocarbon pressure.

On the newer units at Esso's Baton Rouge refinery, the water-disengaging drum is not installed. The reason for not installing the disengaging drum is that most of the cooling towers are of the induced-draft type which are of such construction that any hydrocarbon vapor is discharged at a relatively high and safe location.

Condensable Blowdown Drum

For condensable vapors which contain only relatively small percentages of gases which are non-condensable at atmospheric temperature and pressure, a direct-contact water-quench vertical blowdown drum may be provided. A typical condensable-type blowdown drum is shown in Fig. 2. The drum is equipped with disk-and-doughnut baffles.

The hydrocarbon vapors enter below the baffles and a small continuous water stream enters above the baffles. Usually waste condenser water is used, and a thermostatically controlled value in the water line opens wide if the vapor temperature at the top of the drum reaches 200° F.

The effluent water and hydrocarbon discharge to a sewer which prevents vapor from escaping. A large-diameter stack, generally 30 in. is on top of the drum, which is usually 10 by 30 ft. The stack is extended above adjacent surrounding equipment or else the overhead may release to a flare stack through a disengaging drum.

Emergency Spheres

In current practice a pressure storage sphere may be provided to receive the emergency discharge (pulldown) of light ends. The sphere should be big enough to contain all the liquid hydrocarbon holdup from two units when several units are manifolded to one sphere. The sphere usually operates at 75-100 psig., and should have an automatic pressure release to discharge flashed vapor to a flare.

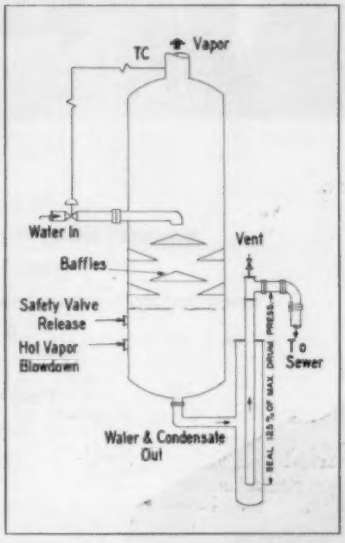
Flare Stack

Flare stacks may be either derrick or guy-supported. The normal height ranges from 200 to 250 ft. if any operating equipment is in the vicinity. Usually the vapor-release lines from the blowdown drums at several operating units will be tied into one flare stack. The vapor-release lines should also be manifolded to a second stack to permit necessary equipment inspection. A seal drum is provided at the stack to prevent flashbacks through the vapor lines. A flashback would occur if the proper mixture of air and hydrocarbon vapor were present in the vapor lines extending from the units to the flare stack. The water seal shown in Fig. 3 prevents this flashback from entering the seal-drum vapor-inlet line.

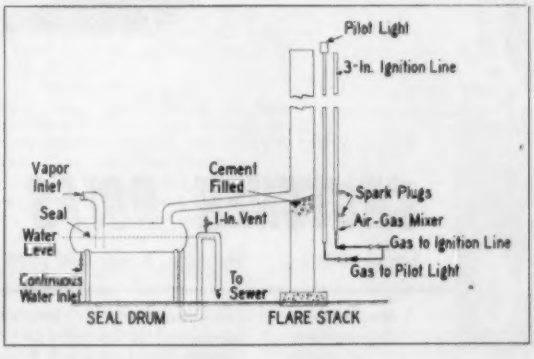
A typical seal drum and stack installation is shown in Fig. 3. The stack, made of steel pipe, is sized for a pressure drop in the range of 1-2 psi. The pilot light, which should burn continuously, is provided with a spark-plug-type remote ignition system. Usually the upper 10-ft. section of the stack is made of a stainless-steel alloy to withstand possible corrosion and high temperatures.

The seal drum (Fig. 3) contains water which provides a seal of several inches on the inlet headers. The seal volume is specified as sufficient to fill 8 to 10 ft. of the vertical vapor-inlet lines. The water in the drum will spend the explosive impact of a flare-stack flashback.

The gas-inlet lines should come overhead and have a vertical drop of at least 8 ft. to the seal drum. The depth of the seal should not exceed 6 in. and a small continuous flow of water should be provided to insure that the seal will be maintained despite vaporization and entrainment losses.



CONDENSABLE-TYPE blowdown drum is equipped with disk-and-doughnut baffles. Fig. 2.



SEAL DRUM and flare-stack installation. Fig. 3.

This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso Standard Oil Co.

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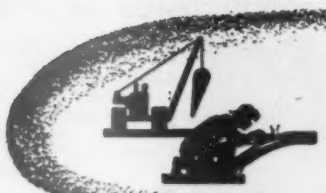

Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups —U. S., Canadian, and Foreign— and according to type of line—crude, products, or natural gas.

U. S. Crude Oil Pipelines

- **Cameron Crude Oil Corp.**, Tulsa.
  Project: 45 miles of 6 and 8-in. trunk line and 16 miles of gathering line from Laverne, Okla., to Jayhawk Pipe Line, Harper Ranch station, Clark County, Kans.
  Status: Under way.
  Contractor: **Monarch Constructors, Inc.**, Medicine Lodge, Kans.
  Completion: Summer 1959.
- **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
  Project: Line from lower Delaware Bay to Philadelphia.
  Status: Planned.
  Completion: 1960.
- **Gillette Pipeline, Inc.**, and **A. W. Hartwig, Inc.**
  Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
  Status: Pending Wyoming Public Service Commission approval.
- **Great Northern Railway Co.**
  Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Mont. and N. D., to Clearbrook or St. Paul, Minn.
  Contractor: **Pipe Line Technologists, Inc.**, Houston, has completed feasibility study.
- **Husky Oil Co.**, Cody, Wyo.
  Project: Gathering lines to the refinery at Cody.
  Status: Planned.
- **International Oil Pipeline Corp.**, New York City.
  Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canadian Crude-Oil Pipelines).
  Status: Proposed.
- **Mid-Continent Pipe Line Co.**, Tulsa.
  Project: Lines in Okla.: 3 miles of 10-in. from Duncan to Velma; 6 miles of 8-in. from Cromwell to Tiger Creek Junction; 5 miles of 6-in. from Key West to Beggs, 12 miles of 8-in. from Drumright to Tulsa; 7 miles of 4-in. from Key West to Davenport.
  Status: Planned.
  Completion: 1959.
- **Pasotex Pipe Line Co.**, El Paso.
  Project: 35 miles of 2, 4, and 6-in. gathering line in Reeves County.
  Status: Scheduled for completion by Aug. 1, 1959.
- **Service Pipe Line Co.**, Tulsa, Okla.
  Project: 9 miles of 10-in. from Snyder to Colorado City, Tex.
  Status: Planned.
  Completion: November 1959.
- **Teton Pipeline Co.**, Denver.
  Project: 8 miles of 5-in. to connect O'Brien field, Carbon Co., Wyo., with the Sinclair Pipe Line system.
  Status: Planned.
- **Texas Gas Transmission Corp.**, Owensboro, Ky.
  Project: 19½ miles of 3½-in. line off Louisiana coast.
  Status: Planned.

U. S. Products Pipelines

- **Badger Pipe Line Co.**, Bartlesville, Okla.
  Project: 2½-miles lateral from main Badger line to O'Hare Air Field in the Des Plaines, Ill., area near Chicago.
  Status: Planned.
- **Buckeye Pipe Line Co.**, N. Y. C.
  Project: 100 miles of 8-in. from Wayne, Mich., to Flint and Owosso, Mich.
  Status: Under way.
  Project: 19.5 miles of 8-in. from Wayne to Trenton, Mich.
  Status: Under way.
  Contractor: **R. L. Coolsaet Construction Co.**, Dearborn, Mich.
  Completion: Fall 1959.
- **Continental Pipe Line Co.**, Ponca City, Okla.
  Project: 155 miles of 6-in. from Artesia, N.M, to El Paso, Tex.
  Status: Planned.
  Completion: Nov. 1, 1959.
- **Florida Pipeline & Storage Co.**, Uniontown, Pa.
  Project: 54 miles of 8-in. from Port Everglades to Homestead Air Force Base, Fla.
  Status: Under way.
  Contractor: **Ewin Engineering Corp.**, Washington, D.C., has engineering supervision contract.
  Completion: Nov. 1, 1959.
- **Great Lakes Pipe Line Co.**, Kansas City, Mo.
  Project: 64 miles of 12-in. from Iowa City to Princeton, Iowa, and 62 miles of 12-in. from Cordova to Lee Center, Ill.
  Status: Planned.
- **Husky Oil Co.**, Cody, Wyo.
  Project: Line from Cody to the Yellowstone products line west from Billings, Mont.
  Status: Planned.
- **Kaneb Pipe Line Co.**, Houston.
  Project: 111 miles of 6-in. from Phillipsburg, Kans., to Fairmont terminal near Geneva, Neb., and 168 miles of 6-in. from Fairmont to Yankton, S.D.
  Status: Under way.
  Contractor: **Williams Brothers Co.**, Tulsa.
  Completion: Fall 1959.
- **Katy and New York Central Railroads.**
  Project: 2,500 miles of 10-in. and smaller LPG line from Houston through Kansas City, St. Louis, Indianapolis, and Cleveland to Syracuse, then down to New York City. A branch would go through Chicago to Detroit.
  Status: Proposed.
  Contractor: **Williams Brothers Co., Tulsa, has completed feasibility study.**
- **Southern Pacific Pipe Lines, Inc.**, Los Angeles.
  Project: 9 miles of 6-in. from Yuma, Ariz., to Yuma Marine Corps. Auxiliary Air Station.
  Status: Under way.
  Completion: Aug. 15, 1959.
- **Texas Eastern Transmission Corp.**, Houston.
  Project: A 10-mile, 12-in. line from Mont Belvieu terminal to Baytown, Tex.
  Status: Planned.
  Completion: Summer 1959.

U. S. Natural Gas Pipelines

- **Arkansas Industrial Pipeline Corp.** (Arkansas Louisiana Gas Co.), Shreveport, La.
  Project: 130 miles of 18-in. from Perla to Helena, Ark.
  Status: Planned.
  Completion: 1959.
- **Arkansas Louisiana Gas Co.**, Shreveport, La.
  Project: 3 miles of 2-in., 58.5 miles of 4-in., and 2 miles of 6-in. gathering line.
  Status: Planned in 1959.
  Project: 77.4 miles of 6-in. transmission lines.
  Status: Planned in 1959.
- **Atlantic Seaboard Corp.**, Charleston, W. Va.
  Project: 19.8 miles of 26-in. loops in West Virginia and Virginia.
  Status: Under way.
  Contractor: **H. L. Gentry Construction Co.**, Jackson, Mich.
  Completion: Fall 1959.
  Project: 43.4 miles of 26-in. in W. Va.
  Status: Under way.
  Contractor: **Williams Brothers Co., Tulsa.**
  Completion: Summer 1959.
- **Carolina Pipeline Co.**, Columbia, S. C.
  Project: 22 miles of 4-in. line from Transcontinental line to Calhoun Falls, S. C., and 13 miles of 4-in. from Calhoun Falls to Abbeville, S. C.
  Status: Under way.
  Contractors: **Wavco, Inc.**, Morristown, Tenn., and **Watkins Construction Co.**, Gadsden, Ala.
  Completion: August 1959.
- **Central Hudson Gas & Electric Corp.**, Poughkeepsie, N. Y.
  Project: 13 miles of 10-in. from Highland to Kingston (Part II), N. Y.
  Status: Planned.
  Completion: 1960.
- **Chicago District Pipeline Co.**
  Project: 50 miles of 36-in. from Joliet to Chicago.
  Status: Under way.
  Contractor: **Contracting & Material, Co.**, Evanston, Ill.
  Completion: Fall 1959.
- **Cities Service Gas Co.**, Oklahoma City.
  Project: 21.5 miles of 30-in. loop from

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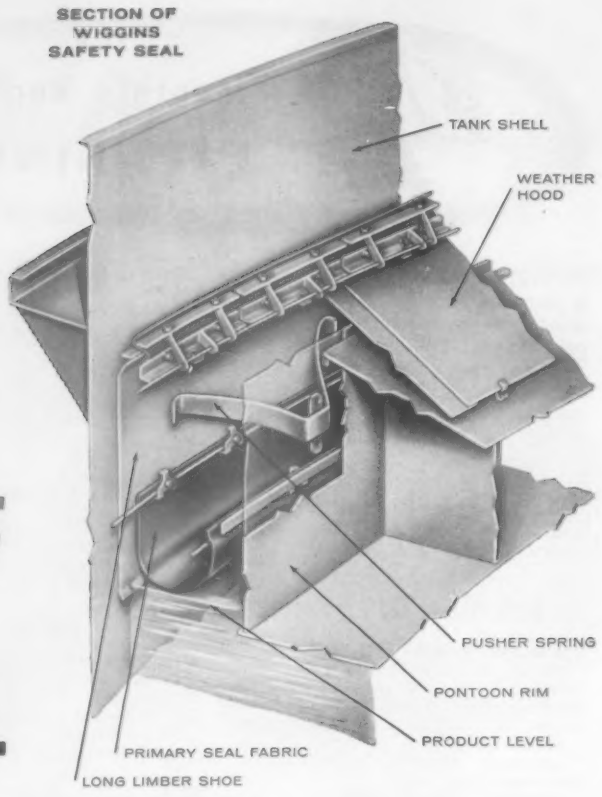

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PIPELINE CONSTRUCTION

Welda to Princeton, Kans.; 10.5 miles of 12-in. replacement and 14.7 miles of 12-in. loop from Hutchinson to Ellsworth, Kans.; 7.2 miles of 16-in. loop near Fort Scott, Kans.; 4.4 miles of 16-in. replacement west of Lawrence, Kans.; and 4.2 miles of 16-in. from Pierce City to Springfield, Mo.

Status: Under way.

Contractors: **Vaughn & Taylor Construction Co., Inc.,** Odessa, Tex., has contract for the Welda and Hutchinson jobs, and **Trojan Construction Co., Inc.,** Oklahoma City, has contract for the other jobs.

Completion: In August and September 1959.

- **Coastal States Gas Producing Co.,** Corpus Christi, Tex.

Project: 49 miles of 18-in. and 55 miles of 20-in. from Kelsey Base (Brooks) to Rodriguez field, La Salle County, Texas.

Status: Planned.

Contractor: **O. R. Burden Construction Corp.,** Tulsa.

Completion: Dec. 1, 1959.

Project: 60 miles of 10-in. in La Salle and Frio counties, Texas.

Status: Planned.

Completion: Jan. 1, 1960.

- **Colorado Interstate Gas Co.,** Colorado Springs, Colo.

Project: 109 miles of 26-in. from Four-Way station in Tex. Panhandle, to Morton Junction in southeastern Colo.; 135 miles of 34-in. from there to Pueblo, and 100 miles of 30-in. on to Denver; 148 miles of 34-in. from CIG line at Rock Springs, Wyo., to Provo, Utah, to connect with proposed El Paso Natural Gas Co.'s line to Calif.

Status: Planned.

Completion: January 1, 1960.

- **Colorado Oil & Gas Corp.,** Denver.

Project: 402-mile line from Gubik field to Fairbanks, Alaska.

Status: Proposed.

- **Columbia Gulf Transmission Co.,** Houston.

Project: 11 miles supply line connecting Block 17 field, East Cameron area, La.

Status: Approved.

Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, La., and 9 miles of various-size field lines in Acadia and Vermilion parishes, La.

Status: Approved.

Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, La., and 3 miles of 6-in. loop in Cameron Parish, La.

Status: Approved.

- **Commonwealth Natural Gas Corp.,** Richmond, Va.

Project: 17.6 miles of 12-in. from Wakefield to Windsor, Va.

Contractor: **Latex Construction of Georgia,** Atlanta.

Completion: Sept. 1, 1959.

- **Consumers Power Co.,** Jackson, Mich

Project: 120 miles of 26-in. from Mich.-Ind. border connection with Trunkline Gas Co., to Plymouth, Mich., and 20 miles of 24-in. from Northville to Clarkston, Mich

Status: Planned.

Completion: Dec. 1, 1959.

- **Dow Chemical Co.,** Midland, Mich.

Project: About 60 miles of 2, 4, 12, and 20-in. line in the Midland, Mich., area.

Contractor: **Shamrock Construction Co.,** Lansing, Mich.

- **El Paso Natural Gas Co.,** El Paso, Tex

Project: 34.2 miles of 20-in. from Puckett, Tex., to Goldsmith plant; 51.3 miles of 20-in. from Terrell to Puckett Plant discharge; and 23 miles of 20-in. from Goldsmith to Eunice-Dumas line.

Status: Planned.

Completion: January 1960.

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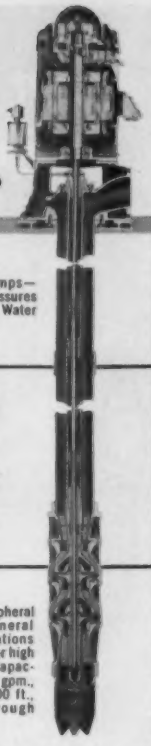

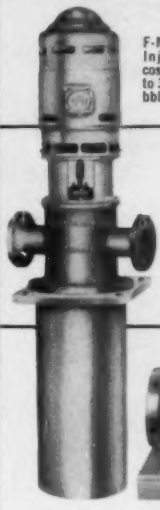

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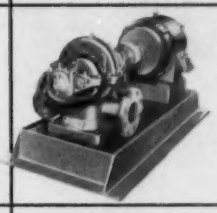

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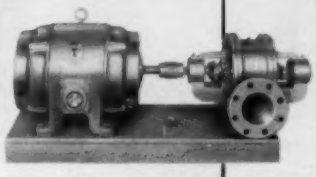

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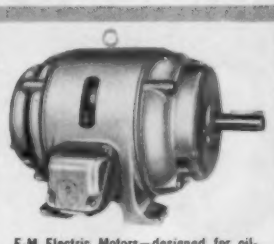

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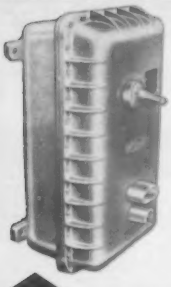

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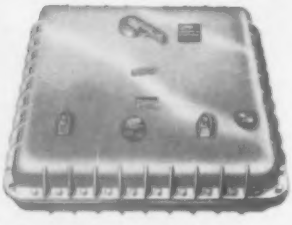

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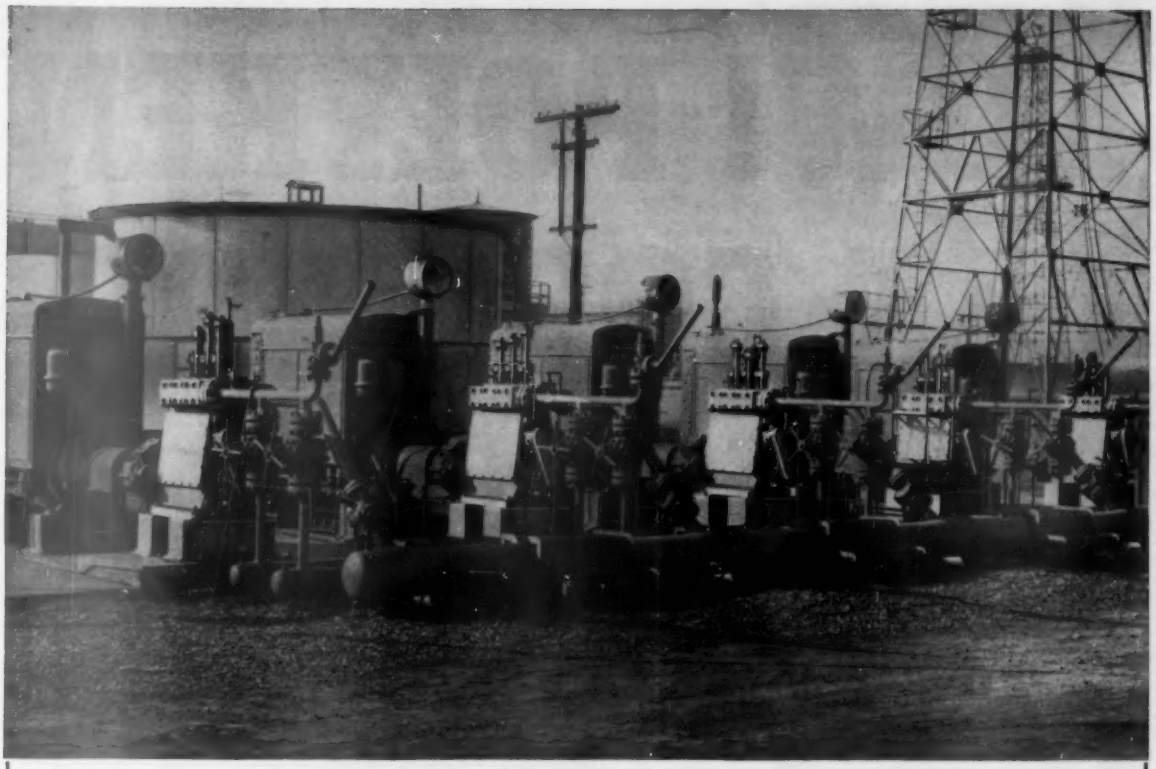
PIPELINE CONSTRUCTION

Project: 244 miles of 30-in. Permian-San Juan Line loops.
Status: Planned.
Completion: November 1959.
Project: 87 miles of gathering lines in Bisti field in San Juan Co., N. M.
Status: Has temporary FPC approval.
Project: 62-mile gathering system of 4½-10-in. in Beaver County, Okla.
Status: Pending FPC approval.
Completion: Fall 1959.
Project: 400 miles of 34-in. from Salt Lake City, to Calif. border near Las Vegas, Nev.

- **Equitable Gas Co.,** Pittsburgh.
  Project: 12.5 miles of 16-in. in W. Va.
  Status: Under way.
  Contractor: **Harford Brothers,** Emporium, Pa.
  Completion: November 1, 1959.
  Project: 15.3 miles of 16-in., 3 miles of 20-in. in W. Va. and Pa.
  Status: Planned.
  Completion: Fall 1960.
  Project: 14.7 miles of 16-in., 5.9 miles of 20-in. in Pa.
  Status: Planned.
  Completion: Fall 1961.
  Project: 17.25 miles of 20-in. in Pa.
  Status: Planned.
  Completion: Fall 1962.
- **Gulf Resources, Inc.,** New York.
  Project: 136 miles of 14 and 20-in. from Hidalgo County to LaSalle County, Texas.
  Status: Pending FPC approval.
- **Hope Natural Gas Co.,** Clarksburg, W. Va.
  Project: 20 miles of 24-in. line in Wetzel and Monongalia counties, W. Va., replacing two 16-in. lines.
  Status: Approved.
  Project: 45-mile line from W. Va. to Pittsburgh area.
  Status: Planned.
  Completion: Fall 1959.
- **Iron Ranges Natural Gas Co., St. Paul.**
  Project: 79 miles of 10 and 12-in. from Grand Rapids to Hoyt Lake, Minn., and 67 miles of 12-in. from Duluth to Silver Bay, Minn.
  Status: Pending FPC approval.
  Completion: Fall 1959.
- **Iroquois Gas Co.**
  Project: 9.5 miles of 16-in. in Erie County, N. Y.
  Status: Pending FPC approval.
- **Kansas-Nebraska Natural Gas Co., Inc.,** Phillipsburg, Kans.
  Project: 15.5 miles of 12-in. loop in northwestern Kansas.
  Status: Planned.
  Completion: Oct. 1, 1959.
- **Laclede Gas Co.,** St. Louis, Mo.
  Project: 107 miles of 24-in. between Hallsville, Mo., and St. Louis.
  Status: Proposed.
- **Lone Star Gas Co.,** Dallas.
  Project: 36 miles of 20-in. from Navarro County to Dallas, Tex.
  Status: Under way.
  Contractor: Company crews.
  Completion: Aug. 1, 1959.
  Project: 4.7 miles of 24-in. in Dallas County.
  Status: Planned.
  Contractor: Company crews.
  Completion: Sept. 1, 1959.
  Project: 12.4 miles of 20-in. from Parker County to Fort Worth.
  Status: Scheduled for completion this summer.
- **Manufacturers Light & Heat Co.**
  Project: 61 miles of 20-in. (to replace 135 miles of old 6-in.).
  Status: Under way.
  Contractor: **Harford Bros.,** Emporium, Pa.
  Completion: Fall 1959.



FIELD REPORT

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OPERATOR: Union Oil Company of California

PUMPS: Five Aldrich Triplex

FLOODING STARTED: July, 1954

EXPERIENCE TO DATE:

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ACCESSORY ROLL—1½ inch I.D. Core—100, 200, 300 ft. length—Price Per Square, Dollars

Quantity, Squares	Less than 182	182 to 500	501 to 1499	1500 to 2999	3000 to 5000	5001 to 25001	25002 and Over
No. 900 Black, 14 mils. No. 910 Gray, 12 mils. No. 940 Black, 12 mils. No. 940 Gray, 12 mils.	13.96	12.90	11.02	9.76	8.54	8.04	7.62
No. 920 Black, 20 mils.	19.30	17.22	15.56	13.78	12.06	11.38	10.76

PIPELINE ROLL—3 inch I.D. Core—400, 600, 800 ft. length—Price Per Square, Dollars

Quantity, Squares	Less than 182	182 to 500	501 to 1499	1500 to 2999	3000 to 5000	5001 to 25001	25002 and Over
No. 900 Black, 14 mils.	13.66	12.20	11.02	9.76	7.90	7.44	7.04
No. 920 Black, 20 mils.	19.30	17.22	15.56	13.78	11.16	10.52	9.95

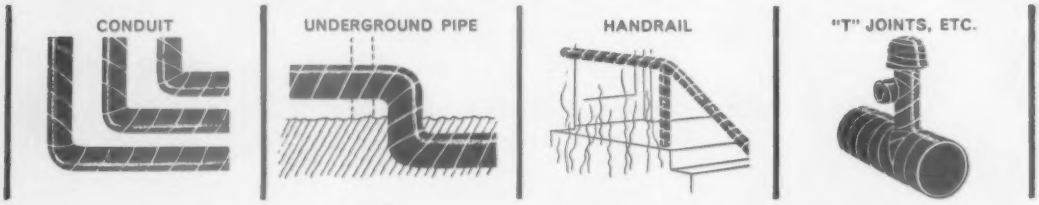
Polyken®

Experienced in modern PROTECTIVE COATINGS

THE KENDALL COMPANY

Polyken Sales Division

CHECK THESE DANGER POINTS IN YOUR PLANT *(and protect 'em with Polyken)*



POLYKEN PROTECTIVE COATINGS DISTRIBUTORS

Atlanta, Georgia
Steele & Associates, Inc.

Chicago, Illinois
Sales Engineering Inc.

Cincinnati, Ohio
Hare Equipment

Cleveland, Ohio
The Harco Corp.

Denver, Colorado
Patterson Supply

Des Moines, Iowa
Donald Corporation

Fort Worth, Texas
Plastic Engineering & Sales Corp.

Harvey, La.
Allen Cathodic Protection Company, Inc.

Houston, Texas
Cathodic Protection Service

Kansas City, Missouri
Industrial Coatings Engineering Co.

Long Beach, Calif.
Barnes & Delaney

Memphis, Tenn.
General Pipe & Supply Co.

Minneapolis, Minn.
Simcoe Equipment Co.

Philadelphia, Pa.
Harold N. Davis Co.

Plainfield, New Jersey
Stuart Steel Protection Corp.

St. Louis, Missouri
Shutt Process Equipment Co.

San Francisco, Calif.
Incandescent Supply Co.

San Francisco, Calif.
Phillips & Edwards Electric Co.

Seattle, Washington
Farwest Corrosion Control Corp.

Seattle, Washington
Pacific Water Works Supply Co.

Polyken

Experienced in modern PROTECTIVE COATINGS

PIPELINE CONSTRUCTION

Project: 10.4 miles of 8-in. replacement from Uniontown to Connellsville, Pa.
Status: Planned.
Contractor: **Wilkie Contracting Co.**
Completion: Sept. 30, 1959.

- **Michigan Consolidated Gas Co.,** Detroit

Project: 53 miles of 30-in. from near Milford to Elsie in Clinton County, Mich.
Status: Under way.
Contractor: **Williams Brothers Co.,** Tulsa.
Completion: Summer 1959.

- **Michigan Wisconsin Pipe Line Co.,** Detroit.

Project: 20 miles of 16-in. loop in Wisconsin.
Status: Pending FPC approval.
Completion: Oct. 1, 1959.
Project: 134.4 miles of 24-in., 27.9 miles of 20-in., 96.3 miles of 16-in., and 11[illegible] miles of smaller diameter lines, in Wisconsin and Michigan.
Status: Pending FPC approval.
Completion: 1960.

- **Midwestern Gas Transmission Co.,** Houston.

Project: 350 miles of 30-in. from Portland, Tenn., to Joliet, Ill.
Status: Under way.
Contractors: **Grayco Constructors, Inc.,** Austin, has 51 miles in Tennessee and Kentucky; **Sharman, Allen, Gay & Taylor, Inc.,** Houston, 43 miles in Kentucky; **Panama, Inc.,** Houston, 53 miles in Indiana; **Majestic Contractors, Ltd.,** Edmonton, Alta., 53 miles in Indiana; and **Bechtel Corp.,** San Francisco, 148 miles in Indiana and Illinois.
Completion: Fall 1959.
Project: 504 miles of 24-in. from Emerson, Man., to Marshfield, Wis., plus 54 miles of sales laterals.
Status: Pending FPC approval.
Completion: 1960.

- **Mississippi River Transmission Corp.** (Mississippi River Fuel Corp.), St Louis.

Project: 115 miles of 24-in. from near Oran in southeast Mo., north between Ste Genevieve and Bonne Terre into vicinity of Herculaneum and Pevely then into St Louis Co.
Status: Planned.
Completion: Last half 1960.

- **Montana-Dakota Utilities Co.,** Minneapolis, Minn.

Project: 16 miles of 6-in. line from Tampico, Mont., to Glasgow Air Force Base, Mont.
Status: Planned.
Completion: Sept. 1, 1959.

- **Monterey Pipeline Co.,** Los Angeles, Calif.

Project: 37.5 miles of 8 and 14-in., and dual Mississippi River crossings in St. James and Lafourche parishes, Louisiana.
Status: Under way.
Contractor: **Houston Contracting Co.**
Completion: September 1959.

- **Mountain Fuel Supply Co.,** Salt Lake City.

Project: 24.4 miles of 20-in. loop from Yellow Creek, Wyo., to Coalville, Utah, plus about 7 miles of 6 and 8-in. south of Rock Springs, Wyo.
Status: Pending FPC approval.
Completion: Oct. 15, 1959, on the Yellow Creek project and Sept. 1, 1959, on the Rock Springs project.

- **Natural Gas Pipeline Co., of America,** Chicago.

Project: About 20 miles of 3, 4, and 6-in. gathering line in Jack and Wise counties, Texas.
Status: Under way.
Contractor: **J. E. Carlson, Inc.,** Pampa, Tex.
Completion: By Aug. 1, 1959.

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NOW—AT LAST A MEASURING WHEEL THAT MEASURES ACCURATELY TO A FRACTION OF AN INCH!

Rolatape's amazing new Model 415 meets all your measuring needs — measuring quickly and surely over the most uneven and irregular terrain with no risk of human error. This time-saving instrument is calibrated to measure accurately in full view of operator as it is rolled along, giving measurements in inches (to ½ inch) on one side of measuring wheel, and tenths of a foot (to .5 of a foot) on the other. Sturdy and lightwight, it is equipped with automatic brake and built-in stand. Handle folds compactly. See one at your dealer's today.

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now...aluminum safety hats and caps by WILLSON® with the right combination for effective head protection

tough aluminum alloy shell *plus*
Geodetic Strap Suspension

IN INDUSTRIAL SAFETY HATS AND CAPS ONLY WILLSON HAS THE TRUE "GEODETIC" SUSPENSION AS DEVELOPED IN CORNELL AERONAUTICAL LABORATORY

Willson Geodetic Strap Suspension dissipates impact shock waves over wide head area. ***Wearer can sustain much heavier blow without injury*** **(above left).** ***It minimizes danger of "bottoming"*** **by conforming to "geodetic" lines of head (center). Geodetic Strap Suspension (above right) spreads and balances weight of hat and** ***prevents slipping and tipping. Tamperproof*** **crown straps permanently fitted to head shape always maintain** ***1-1/4 in. or more clearance.***

Here it is . . . the *right combination* aluminum safety hat so many have asked for: Tough aluminum alloy shell reinforced with safety ribs for extra strength, yet lightweight . . . plus *exclusive* Willson Geodetic Strap Suspension for tamperproof protection against shock of impact. Smooth satin finish of shell is sun-reflecting for cool comfort in hot weather . . . generous shell clearance provides excellent air circulation . . . rolled edges add rigidity to brim. Choice of hat or cap style as shown . . . with the *right combination* for safety, comfort, appearance. Call your Willson distributor or write direct for full information on this newest advancement in head protection.

WILLSON®

PRODUCTS DIVISION
RAY-O-VAC COMPANY
Dept. OGJ
Reading, Pa.

PIPELINE CONSTRUCTION

Project: Nearly 4 miles of 4-in. sales lateral in Adair and Union counties, Iowa.
Status: Scheduled for completion Aug. 28, 1959.

- **New York State Natural Gas Corp.,** Pittsburgh.

Project: 43 miles of 20-in. from Kittanning to Luthersburg, Pa.
Project: 14.5 miles of 26-in. from Chatham Township to Lawrenceville, Pa.
Status: Planned.
Completion: 1959.

- **Niagara Mohawk Power Corp.,** Syracuse, N. Y.

Project: 100 miles of 12-in. from Watertown to Massena, N. Y.
Status: Under way.
Contractor: **Fulghum Contracting Corp.,** Harrisburg, Pa.
Completion: August 1, 1959.
Project: 5.5 miles of 20-in. from Cicero to Syracuse, N. Y.
Completion: July 31, 1959.

- **Northern Illinois Gas Co.**

Project: 140 miles of 22-in. from Des Plaines to East Dubuque, Ill.
Status: Under way.
Contractor: **Contracting & Material Co.,** Evanston, Ill.

- **Northern Natural Gas Co.,** Omaha, Neb.

Project: 217 miles of main line, 221 miles of main-line loops, 1,906 miles of branch lines of various diameters.
Status: Pending FPC approval.
Completion: 1959-61.
Project: 18 miles of 20-in. from Dubuque, Iowa, to Menominee, Ill.
Status: Under way.
Contractor: **Williams Brothers Co.,** Tulsa.
Project 19 miles of 30-in. from Oakland to Ogden, Iowa.
Status: Approved.
Project: 9 miles of 30-in. from Palmyra to Beatrice, Neb.
Status: Approved.
Project: 11 miles of 30-in. from Clifton to Tescott, Kans.
Status: Approved.
Project: 8 miles of 30-in. from Tescott to Bushton, Kans.
Status: Approved.
Project: 169 miles of 20-in. from Farmington, Minn., to Superior, Wis.
Status: Pending FPC approval.
Project: 23 miles of 24-in. main line loop in Neb.
Status: Pending PFC approval.
Project: 44 miles of 16-in. in Duluth-Superior, Wis., area.
Status: Pending FPC approval.
Project: 57 miles of 30-in. main line loop in Iowa, Minn., Neb. and Kans.
Status: Pending FPC approval.
Project: 21 miles of 16-in. connecting Glick field, Kans.
Status: Pending FPC approval.
Project: 188 miles of 24-in. and 215 miles of 30-in. from Farmington, Minn., to International border.
Project: 8 miles of 30-in. main line loop north of Ventura, Iowa, and 22 miles of branch lines near Marshalltown and Griswold, Iowa.
Status: Pending FPC approval.

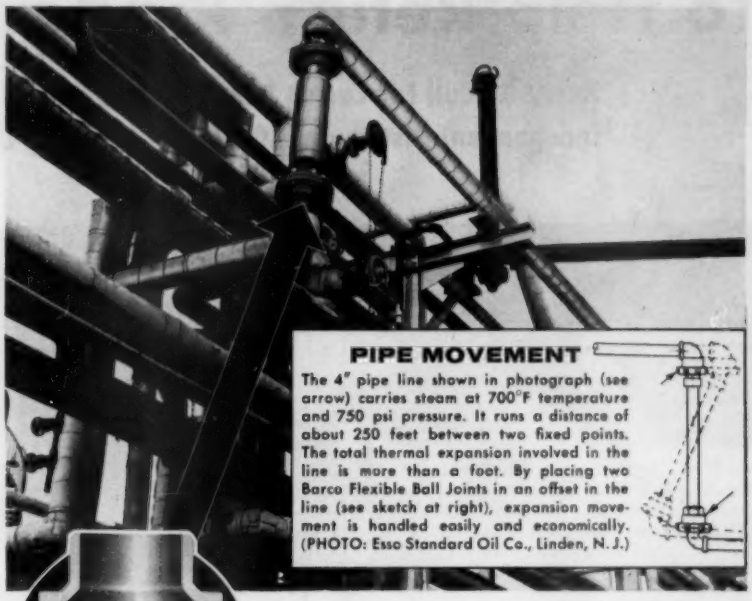
- **Offshore Gathering Corp.,** Houston.

Project: 364 miles in Gulf of Mexico off La.: 60 miles of 24-in., 70 miles of 26-in., and 234 miles of 30-in. dual line.
Status: Pending FPC approval.

- **Ohio Fuel Gas Co.,** Columbus, Ohio

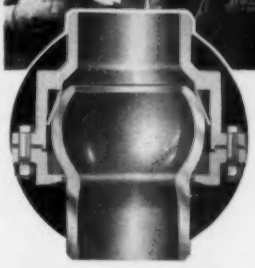
Project: About 30 miles of 18 through 24-in. in various locations in Ohio.
Contractor: **Shamrock Construction Co.,** Lansing, Mich.
Project: Replace 8½ miles with 10 and 12-in. line in Ohio.

How Refinery Handles 700°F. STEAM . . . PIPE EXPANSION



PIPE MOVEMENT

The 4" pipe line shown in photograph (see arrow) carries steam at 700°F temperature and 750 psi pressure. It runs a distance of about 250 feet between two fixed points. The total thermal expansion involved in the line is more than a foot. By placing two Barco Flexible Ball Joints in an offset in the line (see sketch at right), expansion movement is handled easily and economically. (PHOTO: Esso Standard Oil Co., Linden, N. J.)



BARCO HT HIGH TEMP. Flexible BALL JOINTS

SAVE VALUABLE SPACE

The Barco HT (High Temperature) Flexible Ball Joint is a new development. It is *the key* to solving many PIPE EXPANSION PROBLEMS where high temperatures and pressures are encountered. The outer sealing gasket is a special, high temperature ring. The inner take up ring is self-adjusting to thermal expansion and maintains tight sealing action without building up high resistance (friction) to turning or angular flexing. HT joints can be supplied in sizes from 1" to 12", angle or straight, and can be fabricated from materials to withstand as much as 1000°F, 1200°F, or even 1400°F, under certain conditions.

Local Barco Field Engineers will be glad to give you full information and recommendations. Call or write today.

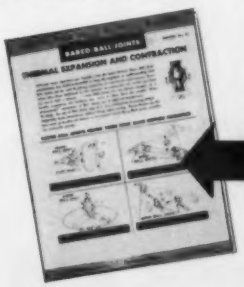
ADVANTAGES:

SAVE SPACE—Barco Ball Joints are used to perform functions similar to U-bends or pipe loops—But with much less space required and often LOWER COST.

NO PRESSURE THRUST—Expensive anchoring or bracing not required to hold piping in place or in line.

HIGH TEMPERATURE, PRESSURE—Wide choice of materials in new Barco HT Joints.

SIMPLE—Easy to solve virtually any problem with aid of two or three Barco Joints.



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3 Store Managers Work Triple Play To Help Return Rig To Operation

Hurry-Up Call For Casing Demonstrates How Pittsburgh Steel Company's Independent Distributors Go All-Out To Help Drilling Crews

Casing has been run, drill pipe is back on rack and A-mast rig stands stark against Texas sky while concrete sets.

Three oil country store managers for a Pittsburgh Steel Company independent distributor teamed up to put a North Texas oil well rig back in operation after the coldest weather in 20 years forced a shutdown.

With water lines frozen and the sludge-pit covered with ice during the cold weather, the drilling contractor was forced to suspend operations. When he was notified of a coming break in the weather, he moved fast to avoid any more lost drilling time.

At 5 a.m., his tool pusher called the independent distributor's store in Wichita Falls, Texas, and asked Store Manager Pete Kovack for 3,500 feet of 5½-inch Pittsburgh Steel Co. casing. Kovack promised action. Kovack called his home office in Fort Worth. Headquarters immediately made a telephone survey of casing stocks at stores in Olney and Graham, Texas, the two closest stores to the rig located in the Young County Regular Pool.

• **Adequate Stocks on Hand**—The telephone check disclosed that Graham, the closest store, had adequate stocks. So Graham Store Manager Leon Mangum roused warehousemen and truck drivers who loaded two trucks with the 3,500 feet of casing. The casing was on the racks at the rig by 8 a.m. long before it was needed by the tool pusher. Work continued without any new delays. Tool Pusher Jesse Johnson, whose company has used more than 70 strings of casing bought from this distributor, said the casing was run in six hours without trouble of any kind.

The driller ran Pittsburgh Steel's J-55 API standard casing with confidence. The distributor had helped work out the most economical string with the lightest weights and lowest grades capable of handling expected stresses—increased by plans to fracture the well with a 2,500 psi pressure.

Store Manager Joseph Reed came over from Olney, 18 miles away, to be on hand when the casing arrived. Later, Mangum stopped by from Graham, 14 miles away, and Pete Kovack visited the rig before the day was over. He made sure the sequence of events he started had been carried

At Olney, Texas, Store Manager Joseph Reed (in checked shirt) loads a pick-up truck to make a daily service call on rig located in the Young County Regular Pool.

On the drilling floor of rig, Tool Pusher Jesse Johnson, left, and Store Manager Pete Kovack of Wichita Falls, Texas, inspect cementing head used to seal hole and Pittsburgh Steel casing.

out successfully. Reed continued to serve the rig's daily needs from Olney until the well was completed.

That incident involving three store managers is typical of the service rendered by this independent distributor. He's been giving that kind of service day-in and day-out for 40 years.

For 30 years, Pittsburgh Steel Co. has supplied this distributor with oil country goods. During those three decades, oil men who bought drill pipe, casing and tubing from this independent distributor used it with confidence that they were getting the best products, backed up by tops in service.

Mr. Independent supplied the service but the quality of the tubular products came from Pittsburgh Steel Co.'s tube mills.

Starting with the proper chemical analysis, Pittsburgh Steel's blast furnaces and open hearths produce steel tailor-made for the oil country.

Steel for these tubular products has to be good right from the start. Only the best steel can undergo the severe forging operation required to pierce solid tube rounds and convert them into seamless tubes. Only steel with perfect surface and internal soundness can be used.

The hydrostatic test given every single joint made is a final guarantee to oil men that tubular goods made by Pittsburgh Steel Co. will do the job in the field.

That's how steel men and independent distributors make a team that oil men are glad to have back them up when they're working against time to complete a well.

You can't do better than the best. And the best is good steel backed by a distributor who has your interest at heart. That's Mr. Independent who owes his allegiance to only one man—the customer who wants oil country goods when he needs them, where he needs them.

Each of the distributors listed here has that goal. You'll like the way Mr. Independent carries out his job for you. Order your next string from the independent distributor nearest you.

Store Manager Leon Mangum inspects casing in yard of Graham, Texas, outlet for a Pittsburgh Steel independent distributor.

Distributor Home Offices

Bradford Supply Company
Bradford, Pennsylvania

Buckeye Supply Company
Zanesville, Ohio

C. W. Cotton Supply Company
Tulsa 5, Oklahoma

Franklin Supply Company
Denver 10, Colorado

Houston Oil Field Material Co.
Houston, Texas

Industrial Supply Company
Wichita Falls, Texas

Iverson Supply Company
Tulsa, Oklahoma

Longhorn Supply Co., Inc.
Houston 14, Texas

Lucey Export Corporation
New York 7, New York

Lucey Products Corporation
Tulsa 19, Oklahoma

McJunkin Corporation
Charleston 22, West Virginia

Midland Supply Company
Wichita 7, Kansas

Mountain Iron & Supply Co.
Wichita 2, Kansas

The Producers Supply & Tool Co.
Fort Worth 2, Texas

Production & Refining Equipment Company
Odessa, Texas

Sandy Supply Company
Wooster, Ohio

Southwest Supply Company
Pittsburgh, Pennsylvania

Superior Iron Works & Supply Co.
Shreveport, Louisiana

Tex-Tube, Inc.
Houston 7, Texas

Western Supply Company
Tulsa 1, Oklahoma

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

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Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio

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SEMI-ENCLOSED — normal or medium slip, 3 phase, 60 cycle. Has prelubricated ball bearings in semi-enclosed protected housing, 40 degree C rise. Built for continuous duty. High Torque, low starting current. Extra insulating coating throughout.

TOTALLY ENCLOSED — Fan cooled, normal or medium slip, 3 phase, 60 cycle. Has prelubricated ball bearings, totally enclosed FAN cooled 55 degrees C rise, for continuous duty. High Torque — low starting current. Extra insulating coating throughout.

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Manufactured by Valley Electric Corporation, St. Louis 8, Mo.

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☐ Filtration/Separation

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Company .....

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PIPELINE CONSTRUCTION

Contractor: **Ohio Pipe Line Construction Co.**, Newark, Ohio.
Completion: August 1959.
Project: 9-mile extension of 24-in. line in Seneca County, Ohio.
Status: Planned.
Contractor: **Shamrock Construction Co.**, Lansing, Mich.
Completion: September 1959.
Project: 5.7 miles of new 10-in. line near Fostoria, Ohio.
Contractor: **Central Pipeline Co.**, Lima.
Completion: August 1959.

- **Oklahoma Natural Gas Co.**, Tulsa.
Project: 10½ miles of 8-in. in Grady County, Oklahoma.
Status: Planned.
Completion: Nov. 1, 1959.
- **Pacific Gas & Electric Co.**, San Francisco.
Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 49 miles in 1959; 82 miles in 1960.
Project: 42 miles of 30-in. from Pittsburg to Irvington, Calif.
Status: Planned.
Completion: 11 miles in 1959; 31 miles in 1960.
Project: 296 miles of 36-in. from Klamath Falls, Ore., to Antioch, Calif.
Status: Pending Canadian export permit and FPC approval.
Completion: 1961.
- **Pacific Gas Transmission Co.** (Pacific Gas & Electric, San Francisco).
Project: 614 miles of 36-in. from Kingsgate, B. C., to California border near Klamath Falls, Ore.
Status: Pending approval of FPC and Canadian authorities to import gas. To start late 1959.
- **Pacific Lighting Gas Supply Co.**, Los Angeles.
Project: 128 miles of 34-in. from Topock, Ariz., to Newberry, Calif.
Status: California Public Utilities Commission has granted certificate contingent upon FPC approval of Transwestern Pipeline Co.'s proposed project terminating at Topock, Ariz.
Completion: November 1, 1959.
- **Pacific Northwest Pipeline Corp.**, Salt Lake City.
Project: 17 miles of 30-in. loop of Spokane-Coeur d'Alene lateral.
Status: Pending FPC approval.
Completion: 1961.
- **Panhandle Eastern Pipe Line Co.**, Kansas City.
Project: 16 miles of 10, 13 miles of 6, 40 miles of 4, and 1 mile of 2-in. gathering line.
Status: Planned.
Contractor: **Hall Construction Co.**
Completion: Dec. 31, 1959.
Project: 22 miles of 4-in., 7 miles of 6-in., and 8 miles of 8-in. gathering lines.
Status: Planned.
- **Pennsylvania Gas Co.**, Warren, Pa.
Project: 23 miles of 10-in. in Erie Co., Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa.; 30 miles of branch lines, and several small distribution lines.
Status: Approved.
- **Peoples Natural Gas Co.**, Pittsburgh.
Project: 30 miles of 20-in. from Bentleyville to Imperial, Pa.
Status: Under way.
Contractor: **Joyce Western Corp.**, Olean, New York.
Completion: Oct. 1, 1959.
Project: 25 miles of 24-in. from Waynesburg, Pa., to W. Va. line near Garrison, Pa.
Status: Under way.

ROYAL PRECISION

LGP-30

Twice the capacity of any computer in its class...easiest to program in basic machine language...lowest in cost

With the compact, powerful LGP-30, you can obtain peak operating efficiency through on-site linear programming...can save substantially on every barrel produced by faster, simpler selection of (1) optimum-level production, sale and purchase of gasoline, butane, naphtha etc.; (2) severity level of the catalytic reformer; (3) tetraethyl lead content.

Because the LGP-30 is mobile, you can now have high-speed electronic computation *wherever you need it.* Operating from any convenient wall outlet, the self-cooled LGP-30 gives you memory (4096 words) and capacity comparable to computers many times its size and cost.

The lowest-priced complete computer you can buy, the LGP-30 has been so simplified that even non-technical personnel quickly grasp its operation. A library of sub-routines and programs is maintained – as well as an active users organization. Service facilities are available coast-to-coast.

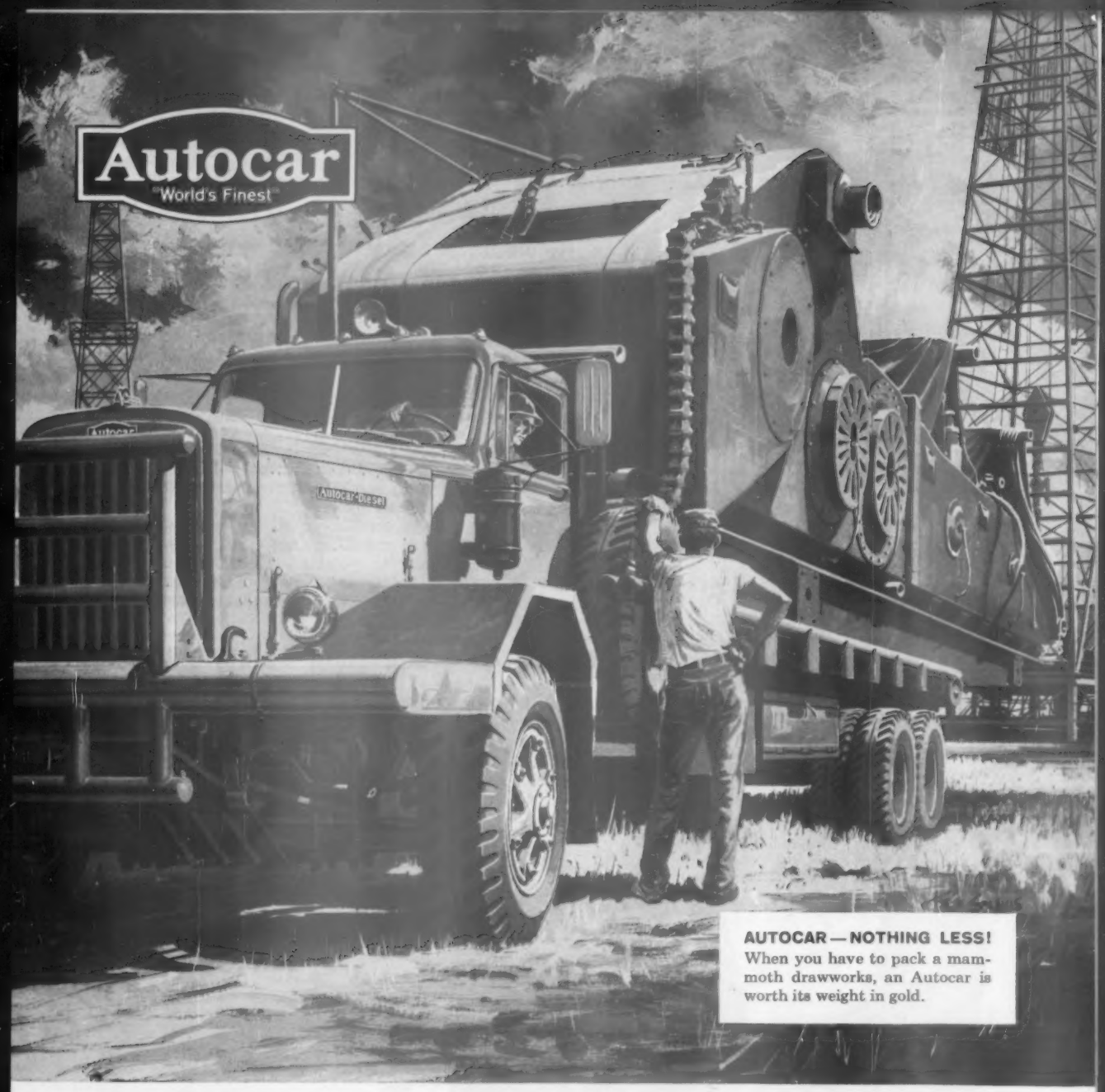
Gives you optimum level efficiency in production, sales, purchase!

Other important jobs now being assigned to the LGP-30 in numerous petroleum installations include the following: pipeline problems; mass spectrometer calculations; analysis of oil field production; flash point calculations; pumping and batching scheduling; correlation of seismic records; reservoir engineering studies; well-logging interpretations.

ROYAL McBEE

data processing division

For further information and specifications, write Royal McBee Corporation, Data Processing Division, Port Chester, N.Y.



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When you have to pack a mammoth drawworks, an Autocar is worth its weight in gold.

"Wouldn't try this with less than an Autocar"

This is a hauling job that could stop another truck—but quick! Out in the oil fields, custom-engineered Autocars prove, time and time again, that it's actually costly to try to get along with anything less.

The reason is that Autocars are engineered—"tailored"—to a *specific* operation. The result is unequaled strength—stamina—trouble-free performance . . . a truck that will do the *best* job.

There are two good ways to really understand the superiority of an Autocar: one is to watch it being built at the factory, from job specifications to finished truck; the other is to drive it. We invite you to do both. We're sure, then, you'll never settle for anything less than an Autocar . . . "world's finest."

Autocar
"World's Finest"

Division of
The White Motor Company
Exton, Pa.

PIPELINE CONSTRUCTION

Contractor: **H. L. Gentry Construction Co.**, Jackson, Mich.
Completion: September 1, 1959.
Project: 17 miles of 10 and 12-in. from Johnstown to Seven Springs, Pa.
Status: Under way.
Contractor: **Joyce Western Corp.**, Olean, N. Y.
Completion: By Aug. 1, 1959.

- **Permian Basin Pipeline Co.**, Omaha, Neb
  Project: 83 miles of 16-in. from the Pioneer gathering line in Schleicher County, Tex., to Spraberry, Tex.
  Status: Pending FPC approval.
  Completion: Fall 1959.
- **Phillips Petroleum Co.**, Bartlesville, Okla.
  Project: Undetermined mileage of gathering lines, Garvin County, Okla.
  Contractor: **George W. Davis.**
  Completion: Oct. 1, 1959.
- **Piedmont Gas Co.**, Hickory, N. C.
  Project: 78 miles of 2 to 8-in. extension off Transcontinental in N. C., to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.
  Status: Approved.
- **Pioneer Natural Gas Co.**, Amarillo Tex.
  Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
  Status: Pending FPC approval.
  Project: 12 miles of 10-in. from Muleshoe, Tex., northward.
  Status: Pending FPC approval.
- **Richfield Oil Corp.**, Los Angeles
  Project: 60 miles of 20-in. from Cuyama Valley to Ventura, Calif.
  Status: Under way.
  Contractor: **Alex Robertson Co.**, Paramount, Calif.
  Completion: Fall 1959.
- **Rio Gas Gathering Co.**, San Antonio, Tex.
  Project: 97 miles of 3 to 8-in. gathering line in Hidalgo County, Tex.
  Status: Pending FPC approval.
  Completion: 1959.
- **Signal Oil & Gas Co., Los Angeles.**
  Project: Extension of gathering system from Tioga, N. D., to near the Canadian border in Burke Co.
  Status: Proposed.
- **South Georgia Natural Gas Co.**, Thomasville, Ga.
  Project: Lines in Ga.: 2 miles of 2-in. near Meigs; 31 miles of 3-in. near Nashville; 41 miles of 4-in. and 39 miles of 6-in. near Tifton.
  Status: Planned.
  Contractor: **Coates Field Service, Inc.**, and **Lockwood, Kessler & Bartlett, Inc.**, have contract for aerial photography, surveying, mapping, and right-of-way acquisition.
  Completion: Summer 1959.
- **South Texas Natural Gas Gathering Co.** (Coastal States Gas Producing Co., Corpus Christi, Tex.)
  Project: A 60-mile line from existing system to steam generating plant in Pearsall County, Tex.
  Status: Planned.
  Completion: January 1960.
- **Southern California Gas Co.** and **Southern Counties Gas Co., Los Angeles.**
  Project: 106 miles of 36-in. and 11 miles of 34-in. from Newberry to Placentia, Calif., and 91 miles of 34-in. from Newberry to Ivanpah Lake.
  Status: Planned.
  Completion: Late 1959 and in 1960.
- **Southern Natural Gas Co.**, Birmingham Ala.
  Project: 47.9 miles of 16-in. from Montegut field to Toca station and 6.4 miles of 6-in. from South Lake Long field to Montegut field.

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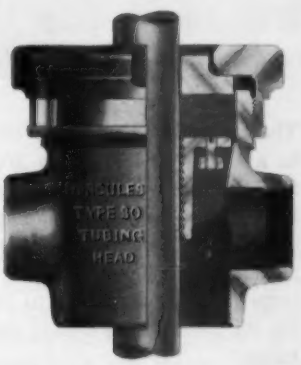

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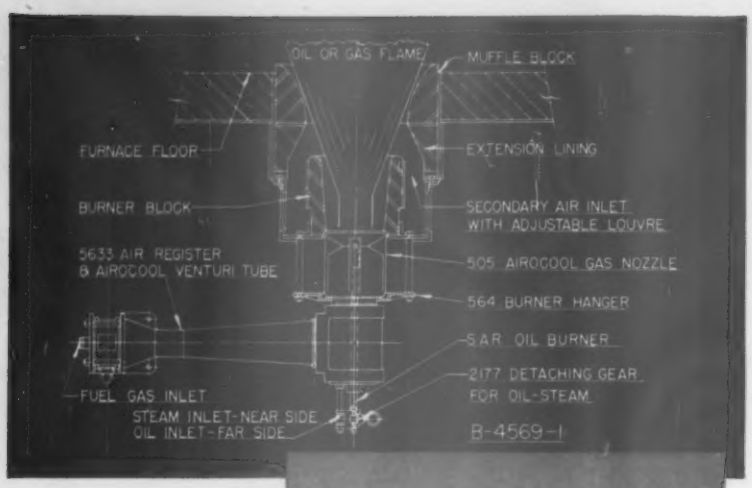

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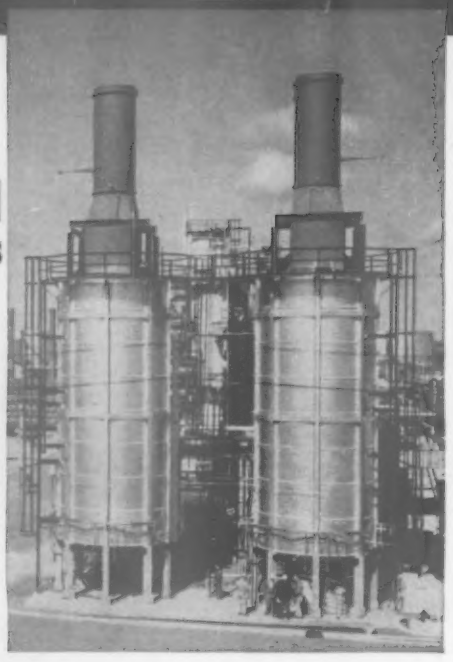

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PIPELINE CONSTRUCTION

Status: Approved.
Completion: Nov. 1, 1959.

Project: 44.9 miles of 24-in., and 65.6 miles of 20-in., Gwinville-Ocmulgee station; 79 miles of 16-in., Ocmulgee-Wrens station; 21.8 miles of 14-in., Griffin-South Atlanta; 78.9 miles of 18-in., Gwinville-Cranfield field; 17.1 miles of 20-in., main line to Toca station; 2.3 miles of 12-in., Coffee Bay field to Lake Enfermer lateral; 5 miles of 8-in., Sandy Hook field lateral loop; 6.4 miles of 6-in. and 47.9 miles of 16-in. from South Lake Long field to Toca compressor station.

Status: Pending FPC approval.
Completion: Nov. 1, 1959.

Contractors: Contracts have been awarded for some 300 miles of line to **Oklahoma Contracting Co.**, Dallas; **Harbert Construction Corp.**, Birmingham, Ala.; **Buchanan Contracting Co.**, Birmingham; and **C. S. LeNoir Construction Co.**, Austin, Tex.

- **Tennessee Gas Pipeline Co.**

Project: 70 miles of 30-in. from Portland, Tenn., to Greensburg, Ky.
Status: Under way.
Contractor: **Williams Brothers Co.**, Tulsa.

Project: 72 miles of 30-in. in Kentucky.
Status: Under way.
Contractor: **Western Pipe Line, Inc.**, Austin, Tex.

Project: About 30 miles of 30-in. in Kentucky and 28 miles of 26-in. in Kentucky and West Virginia.
Status: Under way.
Contractor: **H. C. Price Co.**, Bartlesville, Okla.

- **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney field, Miss., westerly to connect with Olin Gas Transmission Co.'s line in Tensas Parish, La.
Status: Approved.

- **Texas Eastern Transmission Corp.**, Shreveport, La.

Project: 13 miles of 30-in. from Grennup Co., Ky., to Scioto Co., Ohio; 16 miles of 30-in. from Noble Co. to Monroe Co., Ohio.
Status: Pending FPC approval.
Completion: 1959.

Project: 13 miles of 30-in. in Bucks Co., Pa.; 81 miles of 24-in. from Leidy Storage field to Perulack Station, Pa.; 66 miles of 30-in. from Delmont, Pa., to Lambertville, N. Y.; 23 miles of 20-in. from Station 25 to Chester Junction, Pa.
Status: Pending FPC approval.
Completion: 1959.

Project: 40 miles of 36-in. from Station 26 to Station 27 in N. J., and 4 miles of 30-in. from Station 27, N. J., to Staten Island, N. Y.
Status: Pending FPC approval.
Completion: 1959.

- **Texas Electric Service Co.**, Fort Worth, Tex.

Project: 290-mile 22 or 24-in. line from Old Ocean field, Brazoria County, Texas, to Fort Worth, and 70-mile 16-in. line from there to Graham, Tex.
Status: Planned.
Completion: Fall of 1960.

- **Texas Gas Transmission Corp.**, Owensboro, Ky.

Project: 72 miles of 30-in. line in Louisiana and Arkansas.
Status: Under way.
Contractor: **Houston Contracting Co.**
Completion: Nov. 1, 1959.

Project: 18.7 miles of 30-in. in Mississippi and 18.7 miles of 26-in. in Kentucky.
Status: Under way.

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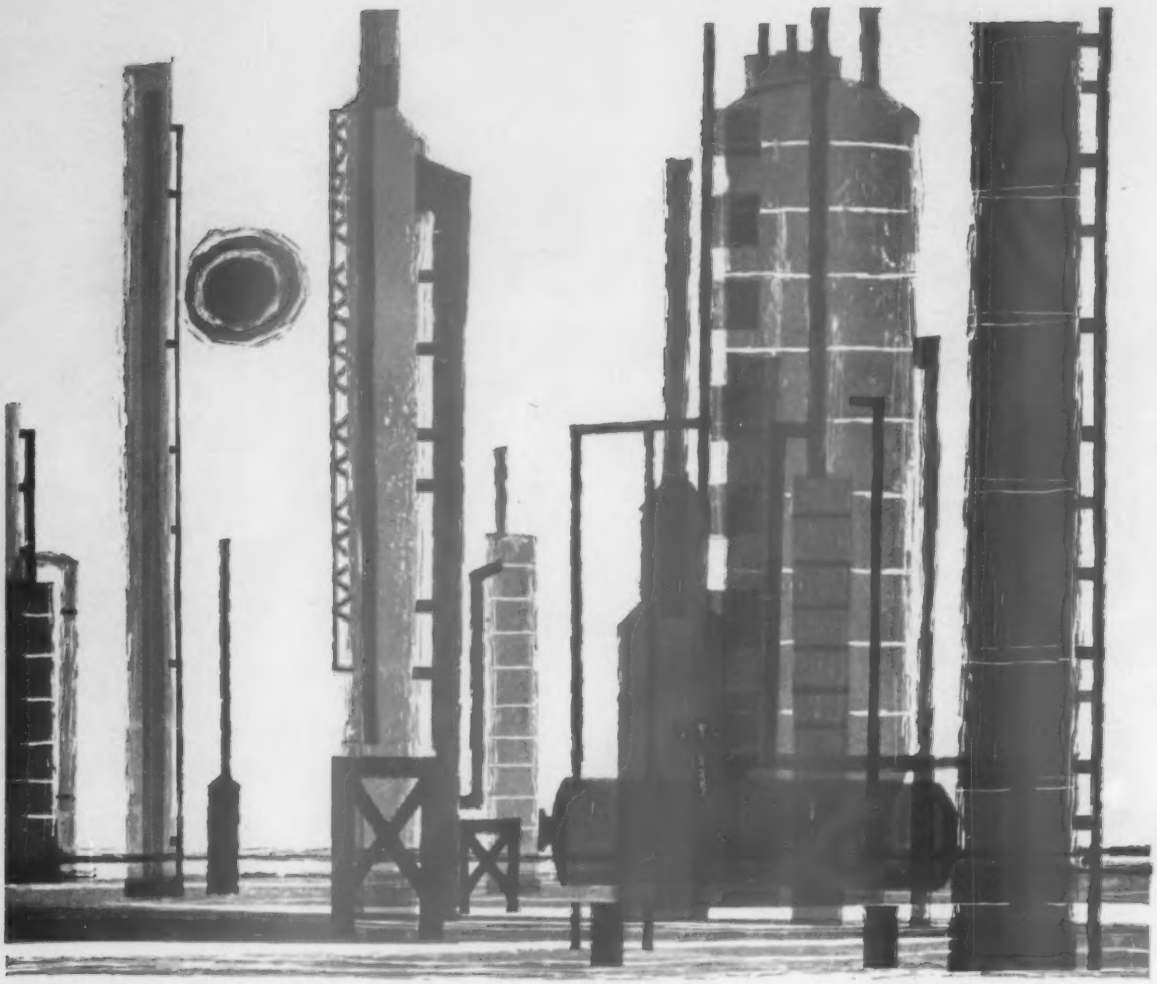

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PIPELINE CONSTRUCTION

Contractor: **Western Pipe Line, Inc.,** Austin, Tex.
Completion: Nov. 1, 1959.
Project: About 164 miles of 30-in. ir Kentucky, Tennessee, Louisiana, Arkansas, and Mississippi.
Status: Planned.
Project: 81.7 miles of 26-in. in Kentucky, Indiana, and Ohio, and 6.9 miles of 12¾-in. near Dixie, Ky.
Status: Planned.
Project: 19.5 miles off Louisiana coast and 32.8 miles of 12¾-in. in South Louisiana.
Status: Planned.

• **Texas Illinois Natural Gas Pipeline Co.,** Chicago.
Project: 860 miles of 30-in. looping of present system.
Status: Planned.
Completion: 1960-1961.
Project: 10.6 miles of 8-in. line in Starr and Hidalgo counties, Texas.
Status: Pending FPC approval.

• **Transcontinental Gas Pipe Line Corp.,** Houston.
Project: 58 miles of 36-in. main line loop in New Jersey.
Status: Under way.
Contractor: **J. P. Neill & Co., Inc.,** Dallas, Tex.
Completion: 1959.
Project: 29 miles of 30-in. main line loop in Pennsylvania.
Status: Under way.
Contractor: **Panama - Williams Corp.,** Houston.
Completion: 1959.
Project: 127 miles of 20-in. and under, of gas purchase laterals in Louisiana.
Status: Under way.
Contractor: **Great Lakes Dredge & Dock Co.**
Completion: 1959.
Project: 314 miles of 24-in. and under, Southeast Louisiana gathering system.
Status: Under way.
Contractor: **Brown & Root, Inc.,** Houston.
Completion: 1959.
Project: 38 miles of 30-in. main line loop.
Status: Pending FPC approval.
Contractor: **H. L. Gentry Construction Co.,** Jackson, Mich.
Completion: 1959.
Project: 74 miles of 36-in. main line loop.
Status: Pending FPC approval.
Contractor: **Samuel Gallucci & Sons, Inc.,** Long Island, N.Y.
Completion: 1959.
Project: 45 miles of 30-in. and 78 miles of 36-in. main line loop.
Status: Pending FPC approval.
Completion: 1960.
Project: 18 miles of 20-in. main line loop.
Status: Pending FPC approval.
Completion: 1959.
Project: 53 miles of 24-in. and under, gas purchase laterals in Louisiana.
Status: Pending FPC approval.
Completion: 1959.

• **Transwestern Pipe Line Co.** (Warren Petroleum, Monterey Oil Co., J. R. Butler), Houston.
Project: 635 miles of 24-in. from Perryton and Fort Stockton, Tex., to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz.
Status: Pending FPC approval.

• **Trunkline Gas Co.,** Houston, Tex.
Project: 48 miles of 16-in. and 31 miles of 4 to 12-in. gathering line from Hitchcock to Katy, Tex.
Contractor: **H. H. Null, Inc.**
Project: 24.5 miles of 12-in. gathering line from Lowry, La., to Cameron Parish shoreline.
Contractor: **Sam Carline, Inc.,** Berwick, La.
Projects: 6.6 miles of 12-in. gathering line to Block 67, Cameron Parish, Louisiana; 19.6 miles of 16-in. in marsh and 5.3 miles of 14-in. in Gulf to Block 26, Vermilion Parish; and 41.9 miles of 24-in. loop from west of Moss Hill, Tex., to Silsbee, Tex.
Contractor: **Sharman, Allen, Gay & Tay-**

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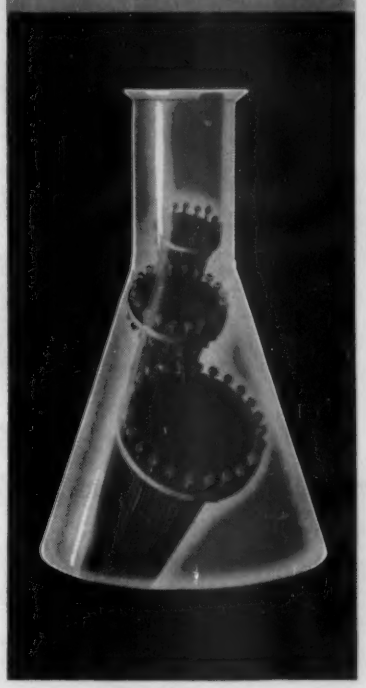

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PIPELINE CONSTRUCTION

lor, Inc., Houston.

Project: 43.3 miles of 4 to 20-in. gathering line from Lowry, La., toward shoreline, Vermilion Parish.

Contractor: **Western Pipeline, Inc.**, Austin.

Project: 53.3 miles of 30-in. loop from Pitkin, La. to Pollock, La.

Contractor: **Grayco Constructors, Inc.**, Austin, Tex.

Project: 61.4 miles of 30-in. loop from Pollock, La., to pipe line valve 63.

Contractor: **APV Co., Inc.**

Projects: 118 miles of 30-in. loop from Kilbourne, La., to Ballentin, Miss., and 60 miles of 30-in. from Brownsville, Tenn., to Canadaville, Tenn., and from Bardwell, Ky., to Polk, Tenn.

Contractor: **Panama, Inc.**, Houston.

Project: 57 miles of 30-in. loop from Polk, Tenn., to Brownsville, Tenn.

Contractor: **C. S. LeNoir Construction Co.**, Austin.

Project: 112.5 miles of 30-in. from Marion, Ill., to Neoga, Ill.

Contractor: **Panama - Williams Corp.**, Houston.

Project: 62.2 miles of 26-in. extension from Tuscola, Ill., to Rossville, Ill.

Contractor: **Contracting & Material Co.**, Evanston, Ill.

Project: 136.6 miles of 26-in. extension from Rossville, Ill., to Vistula, Ind.

Contractor: **Engineers Limited Pipeline Co.**, San Francisco, Calif.

Completion: Work is under way on the above-mentioned Trunkline projects with completion expected by the end of 1959.

• **United Fuel Gas Co.**, Charleston, W. Va.

Project: 18½ miles of 26-in. in Kanawha County, West Virginia.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.**, San Francisco.

• **United Gas Pipe Line Co.**, Shreveport, La.

Project: 200 miles of 30-in. line from Southeast Louisiana to Mobile.

Status: Scheduled for completion by Aug. 1, 1959.

Contractors: **Williams Brothers Co.**, Tulsa; **Pentzian, Inc.**, Omaha, Neb.; **O. R. Burden Construction Co.**, Tulsa; **Hallmac Construction Co.**, Houston; and **Houston Contracting Co.**

Project: 14 miles of 12-in. to connect North Henderson field area, Rusk County, Texas.

Status: Planned.

• **Valley Gas Transmission, Inc.** (Fish Engineering Corp.), Houston.

Project: 150 to 160 miles of 3 to 6-in. gathering lines to tap fields in Starr, Hidalgo, Brooks, and Jim Wells counties, Tex.

Status: Pending FPC approval.

Completion: 1959.

• **Western Slope Gas Co.**, Denver, Colo.

Project: 14 miles of 8 and 6-in. and 20 miles of 4-in. from transmission line north of Grand Junction, Colo., to South Canyon and Baxter Pass area.

Status: Planned.

Completion: October 1959.

Canadian Crude Oil Pipelines

• **Act Oils, Ltd.**

Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Kitimat, B. C.

Status: Pending British Columbia Government approval.

• **Bituminous Oil Pipeline Co.** (Royalite Oil Co., and Can-Amera Oilsands Development, Ltd.)

Project: A 250-mile line from Athabasca

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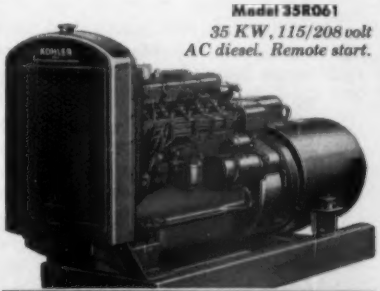

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PIPELINE CONSTRUCTION

oil sands in northeastern Alta., to Edmonton.

Status: Proposed.

Completion: 1960.

- **Gibson Crude Oil Purchasing Co., Ltd.,** Calgary.

Project: 180-mile 8-in. line from Milligan Creek, B. C., to Grand Prairie, Alta.

Status: Permit sought from B. C. government.

- **Independent Pipe Line Co.** (Home Oil Co.), Calgary.

Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in. feeder lines from Calgary to Bellshill Lake, Alta., on the 36-in. line.

Status: Proposed.

- **Mid-Continent Pipe Lines, Ltd.,** Edmonton, Alta.

Project: 1,500 miles of 30-in. from Edmonton to Chicago, via Sask., N. D., Minn., Wis., and Ill. U. S. section to be owned by International Oil Pipeline Corp., New York City.

Status: Pending Canadian Board of Transport Commission approval. **W. C. Gilman & Co.,** New York City, has made preliminary study.

- **Peace River Oil Pipe Line Co., Ltd.** Calgary, Alta.

Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alta.

Status: Approved.

Project: 220-mile, 8-in. line from Milligan Creek field, B. C., to Dawson Creek, B. C., and Sturgeon Lake, Alta.

Status: Permit sought from B. C. government.

Completion: Nov. 1, 1959.

- **Pembina Pipe Line, Lt.,** Drayton Valley, Alta.

Project: 34 miles of 3, 4, and 6-in. gathering line in Pembina field.

Contractor: **Mannix Co., Ltd.**

Completion: November 1959.

- **Trans-Prairie Pipelines, Ltd.,** Edmonton. Alta.

Project: 6-8-in. line from Weyburn field to Regina and Moose Jaw, Sask.

Status: Proposed.

Canadian Products Pipelines

- **Foothills Products Pipe Line, Ltd.** (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.

Project: Gathering system to connect Alta gasoline plants to trunk line from Alta. to Pacific Coast.

Status: Proposed.

- **Hydrocarbons Pipeline Co.,** Winnipeg Man.

Project: 800 miles of 6, 8-in. LPG line from near Edmonton to Fort William, Ont.

Status: Has Parliament of Canada approval. Seeking approval of Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.

Contractor: **Dutton - Williams Brothers, Ltd.,** Calgary, and **A. D. Little Co.,** Boston, are consultants.

- **Pembina Pipe Line, Ltd.,** Edmonton, Alta.

Project: A 1,200-mile line to carry sulfur, LPG, and natural gasoline from Alta.'s gas fields to eastern Canada.

Status: Proposed.

Canadian Natural Gas Pipelines

- **Alberta Gas Trunk Line Co., Ltd.,** Calgary.

Project: 122 miles of 30-in. from Princess

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PIPELINE CONSTRUCTION

to Torrington, Alta.; 152 miles of 6 to 16-in. at various locations.

Status: Under way.

Contractor: **Mannix Construction Co., Ltd.**, Calgary, has 122 miles of 30-in.; **Marine Pipeline & Dredging, Ltd.**, Vancouver, has 46 miles of 16-in. from Torrington junction to Nevis, 33 miles of 16-in. from Torrington to Carstairs, and the 1,000-ft. Red Deer River crossing at Nevis. **Engelking & James, Ltd.**, Calgary, has contract for 55 miles of lateral, including 21 miles in the Wayne, Makepiece, and Chancellor areas; 6 miles of 8-in. in the Consort area; and 28 miles of 8-in. in the Hilda area.

Completion: September 30, 1959.

Project: 256 miles of 36-in., 75 miles of 30-in., 55 miles of 26-in., 199 miles of various diameter gathering lines, and 42 miles of 16-in. delivery lateral.

Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

- **Alberta Natural Gas Co., Ltd.** (Pacific Gas & Electric Co., San Francisco, and **Westcoast Transmission**, Calgary).

Project: 108 miles of 36-in. across southeastern British Columbia to U. S. border near Kingsgate, B. C.

Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

- **Cartier Gas Corp.** (St. Maurice Gas, Inc., and Consumers' Gas Co., Toronto).

Project: 170 miles from Montreal to Quebec City.

Status: Proposed.

- **Northern Natural Gas Co.**, Omaha.

Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.

Status: Planned.

Project: 32 miles of 24-in. from Pincher Creek to Mont. border to tie in with planned U. S. line on to Minneapolis.

Status: Planned.

- **Saskatchewan Power Corp.**, Regina, Sask.

Project: 52.5 miles of 6-in. and 24 miles of 4-in. from St. Louis to Tisdale, Sask.

Project: 79 miles of 10-in. from Success to Rosetown.

Project: 113 miles of 8-in. from Regina to Yorktown.

Contractors: **Marine Pipeline & Dredging, Ltd.**, Vancouver, has the 4, 6, and 8-in., and **Dutton-Williams Brothers, Ltd.**, Calgary, has the 10-in.

Completion: Sept. 15, 1959.

- **Trans-Canada Pipe Lines, Ltd.**, Toronto.

Project: 500 miles of main-line loops.

Status: Planned.

Completion: Late 1962.

- **Van Tor Oil & Exploration Co.**, Vancouver, B. C.

Project: Line from B. C. mainland to Vancouver Island.

Status: Proposed.

Completion: 1960.

- **Westcoast Transmission Co., Ltd.**, Calgary.

Project: 22-mile extension to connect reserves to be developed in the Jedney and Bubbles area of the Peace River region, British, Columbia.

Status: Planned.

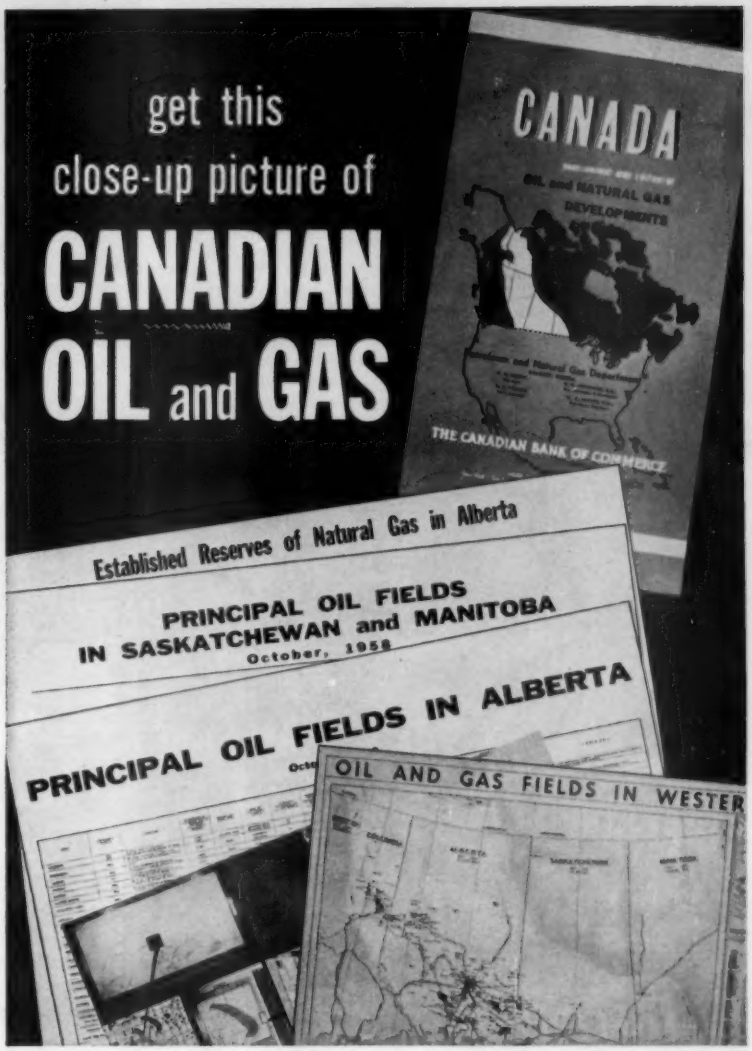
Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Foreign Crude Oil Pipelines

- **Arab Pipeline.**

Project: 1,250-mile 40-in. pipeline from the Persian Gulf to Mediterranean serving fields in Saudi Arabia, Kuwait, Iran, and Iraq.

Status: Proposed by Saudi Arabian Gov-



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PIPELINE CONSTRUCTION

ernment as project of Arab countries.

• **Arabian American Oil Co.**, Dhahran, Saudi Arabia and N.Y.C.

Project: 63 miles of 30, 32-in. from Khursaniyah to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: January 1, 1960.

Project: 18 miles of 34, 36-in. from Qatif to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: July 1, 1962.

Project: 6 miles of 30-in. from Ras Tanura to Ras Tanura terminal; 4 miles of 14-in. from Buqqa to QA-2 pipeline.

Status: Planned.

Contractor: Company personnel.

Completion: October 1, 1960.

• **Assam Oil Co.**, Digboi, Lakhimpur District, Assam, India.

Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.

Status: Planned.

• **Basrah Petroleum Co.**

Project: 70 miles of '30 and 32-in from Zubair to Fac, Iraq.

Status: Planned.

Completion: 1961.

Project: Two 32-in. submarine lines from Fao, Iraq, to island 26 miles out in Persian Gulf.

Status: Under way.

Contractor: **Collins Submarine Pipelines Overseas, Ltd.**, Port Lavaca, Tex.

Completion: Summer 1959.

• **Bolivia-Paraguay.**

Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.

Status: Planned.

• **British Petroleum, Ltd.**

Project: 60 miles of 18-in. across South Wales, from Milford Haven to the Llandarcy refinery.

Status: Under way.

Completion: Late 1959.

• **Burmah Oil Co., Ltd.**, Glasgow, Scotland.

Project: 250 miles of 20-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.

Status: Survey under way.

• **C.R.E.P.S., Societe Nationale de Recherche et d'Exploration des Petroles en Algerie (SN Repal) and Cie. Francaise des Petroles Algerie**, Paris, France.

Project: 470 miles of 24-in. from Edjele fields in southeastern Algeria to the Tunisian Mediterranean coast.

Status: Preliminary work under way.

Contractor: **TRAPSA** (transportation subsidiary of CREPS), with technical assistance and supervision of the project by **Bechtel Mediterranean** (subsidiary of Bechtel Corp., San Francisco).

Completion: September 1960.

• **Elburz Oil Corp.**

Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.

Status: Planned.

• **ENI (Italian state oil agency)** and **Italo-Swiss Finance Co.**

Project: 250-miles of 24-in. and smaller diameters from Genoa to Aigle, Switzerland.

Status: Planned.

Completion: 1961.

• **Iranian Oil Exploration & Producing Co.**

Project: 26 miles of 30-in. from Ganaweh, Iran, to Kharg Island.

Status: Under way.

Contractor: **International Marine Constructors, C. A.**, Port Lavaca, Tex.

Completion: Summer 1959.

• **Iranian Oil Participants, Ltd.**

Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.

Status: Planned.

Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.

Status: Under way.

Contractor: A joint venture of **Raymond Concrete Pile Co. and Williams Bros. Co.**, Tulsa, **Richard Costain, Ltd.**, and **John Brown, Ltd.**, London, and **Werkspoor & Bredoro**, The Netherlands.

• **Iraq Petroleum Co.**, London.

Project: 27 miles of 30-in. loop near T.2 station and 42 miles of 30 and 32-in. loop east of T.3.

Status: Under way.

Completion: 1959.

Project: 40 miles of 24-in. between Homs and Banias, Syria.

Status: Nearing completion.

Project: 31 miles of 30-in. loop east of T.2 station and 25 miles of 30-in. between T.3 and T.4 stations.

Status: Planned.

Completion: Last half 1959.

• **Israel Government**

Project: 16-in. loop of 8-in. line on 235-mile Gulf of Aqaba-Haifa system.

Status: Proposed.

Project: Replace 125 miles of 8-in. from Elath to Beersheba with 16-in.

Status: Under way.

Completion: Mid-1960.

• **Kuwait Oil Co., Ltd.**, London.

Project: 63 miles of 30-in. from Raudhatain area to Ahmadi.

Status: Under way.

Contractor: **Contracting & Trading Co.**, Beirut.

Completion: Third quarter 1959.

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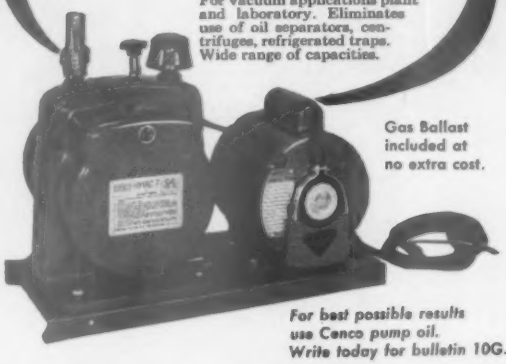

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PIPELINE CONSTRUCTION

- **Mene Grande Oil Co.,** Caracas, Venezuela.

Project: 24 miles of 16-in. from Zarza to Zulus; 12 miles of 24-in. from West Guara to Oficina; 5 miles of 24-in. near Melones.

Status: Planned.

Completion: 1959.

- **Middle East Pipeline.**

Project: 1,500 miles of 38, 40-in. from Persian Gulf to Mediterranean at Iskenderun, Turkey.

- **Oil India Private, Ltd.,** Digboi, Assam, India.

Project: 30 miles of 12-in.; 230 miles of 16-in. and 460 miles of 14-in. from Nahorkatiya, Assam, to Barauni, Bihar.

Status: Planned.

Completion: April 1962.

- **Pan American International Oil Co.,** New York.

Project: 84-mile 12 to 14-in. line from Comodoro Rivadavia field to Argentina's Atlantic Coast.

Status: Under way.

- **Petroleo Brasileiro S. A. (Brazil).**

Project: 40 miles of 12-in. from Catu to Madre de Deus in Bahia.

Status: Under way.

Contractor: **Techint, Inc.**

Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.

Status: Planned.

- **Rotterdam-Rhine Pipeline Co.** (Caltex Petroleum Maatschappij, Bataafsche Petroleum Maatschappij, Gelsenberg Benzin A. G., and Moiloil A. G.)

Project: 59 miles of 30-in. and 96 miles of 24-in. from Rotterdam to Ruhr industrial area in West Germany to supply refineries at Godorf and Wesseling, and a 25-mile branch to Wessel to serve the refinery in Gelsenkuchen.

Status: Under way.

Contractor: **Bechtel International Co.,** is project manager. **Associated Pipe Line Contractors** has most of construction. German and Dutch firms have 33 miles of 24-in. in south Holland and four major submarine crossings.

Completion: Mid-1960.

- **Royal Dutch-Shell.**

Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main line to be 30-in.

Status: Considering project as joint venture with several other companies.

Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.

Status: Planned.

Contractor: **Williams Brothers Overseas, Ltd.,** Tulsa, and **John Brown, Ltd.,** London.

Completion: January 1, 1962.

- **SOPEG** (construction organization for Cie. Francaise des Petrole (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie).

Project: 412 miles of 24-in. from Hassi Messaoud field in the Algerian Desert to Bougie on the Mediterranean Coast.

Status: Under way.

Contractor: **Entrepose Co.** and **Ste. Parisienne pour Industrie Electrique** have 281 miles. **SOCOMAN** and **Eau Assainissement** have 131 miles.

Completion: Late 1959.

- **South European Pipeline Co.** (Jersey Standard, Caltex, and 17 European firms).

Project: 419 mile 30-in. line from Lavera, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany.

Status: Proposed.

- **Superior Oil Co.,** Los Angeles.

Project: A 16 and 24-in. line from its Lake Maracaibo, Venezuela, production to shore.

Status: Planned.

Contractor: **Pipe Line Technologists, C.A.,** Maracaibo, has design.

- **Syrian Pipeline,** Damascus.

Project: 500-mile line from Karshuk field, Syria, to Mediterranean.

Status: Proposed.

- **Union of Soviet Socialist Republic.**

Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.

Status: Under way.

Project: 600-mile line from Russian fields to Czechoslovakia.

Status: Planned for 1960.

Project: Line from Russian fields to East Germany, possibly as part of a petrochemical expansion program.

Status: Planned.

Project: 2,500-mile, 100,000-bbl. crude line from the Volga-Ural oil fields to the Soviet satellites in eastern Europe.

Status: Planned.

Completion: 1965.

- **Venezuelan Sun Oil Co.**

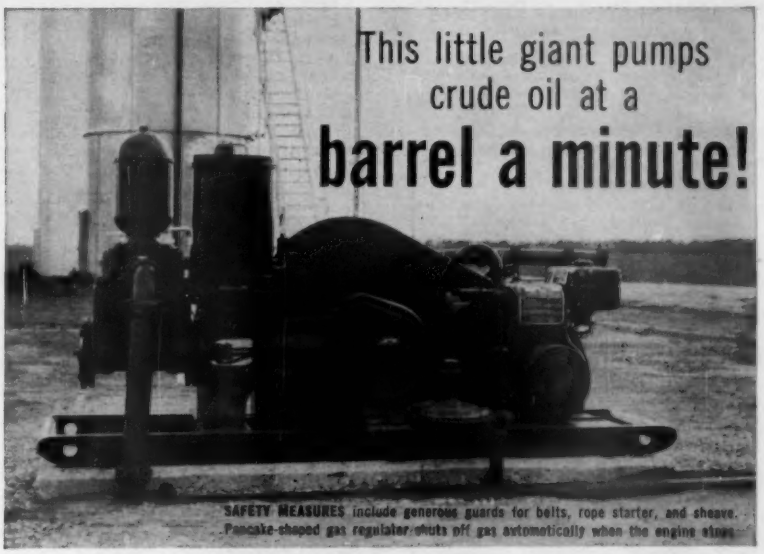
Project: 18-in. crude line from Block 1, Lake Maracaibo, to Punta Palmas terminal.

Status: Under way.

Contractor: **J. Ray McDermott & Co.**

Completion: Summer 1959.

- **Yacimientos Petrolliferos Fiscales (Argentina),** Buenos Aires.



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PIPELINE CONSTRUCTION

Project: 815 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Under way.
Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).
Contractor: **Techint, Inc.**, has subcontract for 600 miles of 12-in.
Status: Under way.
Completion: Mid-1960.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca on the coast.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

Foreign Products Pipelines

- **North Atlantic Treaty Organization** (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington).

Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.
Status: Planned.

- **Petroleos Mexicanos**

Project: Line from Mexico City to Toluca.
Status: Planned.
Project: Line from Mexico City to Cuernavaca.
Status: Planned.
Project: Line from Monterrey to Torreon.
Status: Planned.

- **Pipelines of Puerto Rico,** San Juan.

Project: 95 mile 8-in. line from Commonwealth Oil refinery at Penuelas to Catano in the vicinity of San Juan.
Status: Approved by Puerto Rican Public Service Commission.

- **Union of Soviet Socialist Republic.**

Project: 2,315 miles of 28-in. Trans Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

- **Attock Oil Co., Ltd.,** London.

Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
Status: Planned.

- **Creole Petroleum Corp.,** Caracas.

Project: 17 miles of 30-in., 1.8 miles of 24-in., 1.7 miles of 20-in., and 1.6 miles of 16-in. from Lake Maracaibo flow stations to Conservation plant Bachaquero 1; 22 miles of 12-in. from Bachaquero 1 to Conservation plant Tia Juana 2.
Status: Planned.
Completion: June 1, 1960.

- **Cuban Gas Transmission Co.**

Project: 500-mile line from Campeche area of Mexico across Yucatan and a 150-mile line on the ocean floor to Havana.
Status: Under study by Ebasco Services.

- **French Government,** Paris.

Project: 400-mile big-inch gas line from Hassi R'Mel field to power plant at Bone, Algeria.
Status: Proposed.

- **Gaz de France.**

Project: 550 miles of 16 to 24-in. from Lacq field in southwestern France to Paris.
Status: Under way.
Contractor: French contractors.
Completion, 1960.

- **Indonesian Government.**

Project: 60-mile line from Radja field to proposed ammonia plant near Palembang, Sumatra.
Status: Planned.
Completion: Ammonia plant is scheduled for completion in 1962.

- **Kuwait Oil Co., Ltd.,** London.

Project: 10 miles of 12, 20, and 24-in. line in Burgan field.
Status: Under way.
Completion: Fourth quarter 1959.

- **Mene Grande Oil Co.,** Caracas, Venezuela.

Project: 20 miles of 12-in. from Soto to Mata.
Status: Planned.
Completion: 1959.

- **Petroleos Mexicanos,** Mexico D. F.

Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.
Project: 490 miles of 24-in. from Jose Colomo field in the State of Tabasco to Mexico City.
Status: Preliminary work under way.
Completion: March 1960.
Project: Line from Pemex City to Irapuato.
Status: Planned.
Completion: 1960.
Project: Line from Monterrey to Torreon.
Status: Planned.
Completion: 1960.

- **Sui Gas Transmission Co.,** Multan, Punjab, India.

Project: 130-mile extension of the new 310-mile, 16-in. Multan-to-Sui, Pakistan line. Extension will terminate at Lyallpur.
Status: Planned.

- **Union of Soviet Socialist Republic.**

Project: A 465-mile line from Karadag near Baku to Tbilisi and Erevan.
Status: Under way.
Completion: 1960.
Project: A 127-mile line across the Turkmenian Desert from Kizyl-Kum to the Caspian Sea port of Krasnovodsk.
Status: Under way.
Project: Two parallel lines, each over 1,200 miles long, from Gazly, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Proposed.
Project: Line from near Bukhara, through Tashkent to Chimkent, Dzhambul, Frunze, and Alma-Ata near the border.
Status: Proposed.
Project: Line from Sverdlovsk to Omsk, Kemerovo and Tomsk.
Status: Proposed.
Project: Line from Berezovo field to Sverdlovsk.
Status: Proposed.
Project: Line from Stalingrad to Gorky and to Moscow.
Status: Proposed.
Project: Line from Kanevskoe (Kransnodar) field to Sulkhumi.
Status: Proposed.
Project: Line from Shebelinka field to Rostov, to Odessa, and northward to connect with proposed line from Lvov to Leningrad.
Status: Proposed.
Project: Line from Riga to proposed line from Lvov to Leningrad.
Status: Proposed.
Project: Line from Rostov to Moscow.
Status: Proposed.
Project: Line from Severo-Stavropolskoe (North Stavopol) field to Moscow.
Status: Under way.
Project: Line from Leningrad to Moscow.
Status: Under way.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.
Status: Under way.
Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.), subcontracted to COGAR (River Construction Corp., Ft. Worth, Tex.), Milton Brazier, supt. for 700 miles from Buenos Aires to Tucuman, office at Buenos Aires; E. L. "Tex" Maggard, supt. for 400 miles from Campo Duran to Tucuman.
Completion: August 1960.
Project: Line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26-in. to the connecting point for the Plaza Huincul link and 30-in. from the connection to Buenos Aires.

PICTURED IS 200-MAN CAMP

Elder FIELD TRAILERS

KNOCK-DOWN AND
SKID MOUNTED UNITS AVAILABLE

ELDER field trailers are built to give long, trouble-free service under the toughest off-the-road conditions. You do not pay for house trailer frills. Sold to you direct . . . no middlemen involved.

WORLD-WIDE LEASING—Our special lease plan saves you money. You have no capital investment in trailers, and your leased trailers are chargeable to expense!

TURNKEY OPERATION—We'll operate your camp for you . . . furnish personnel, food, fuel, laundry and pick-up truck.

Kitchens, Diners, Sleepers, Showers, Offices, Power Plant and Water Tank Trailers.

ALASKA: Specialized equipment for Alaskan operations—our complete Turnkey Operation available.

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... an international name in pipeline construction equipment
Progress is a thing easily seen and appreciated by men everywhere—when such progress is so easily demonstrated by CROSE pipeline construction equipment. Crose equipment on the job means more speed . . . more efficiency . . . more economy . . . a symbol of progress in the lives of peoples in many lands. Crose has numerous supply points to expedite pipeline construction work in almost any corner of the world.
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▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .

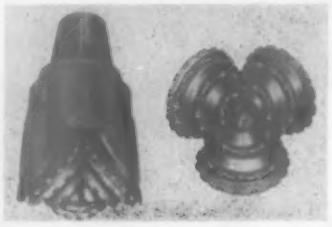
Gas turbine powers helicopter

. . . which can haul 10 to 12 passengers and can land on and take off from land, water, ice, snow, or swamp. The gas turbine powering the S-62 craft permits instantaneous flight.

Empty weight of the helicopter is 4,550 lb., gross weight is 7,500 lb. and useful load is 2,950 lb. It has an average cruising speed of 105 m.p.h. and a maximum speed of 117 m.p.h. Pilots will find the craft gives a clear view of the landing area. The cockpit is easy to get into from the cabin and allows ready communication between the pilot and crew or passengers. The roomy cabin is 14 ft. long. Optional equipment includes an external cargo sling capable of carrying 3,000 lb., internal ferry tanks, and a towing attachment to provide 4,000 lb. of pull for assisting ground equipment which may have become mired or disabled. **Contact Manufacturer: Sikorsky Aircraft Div. of United Aircraft Corp., Stratford, Conn., for details on S-62 helicopter.**

Bit combines features of two types

. . . of bits—tooth type and tungsten-carbide insert type. The YVC Comet bit is designed to fill the need for a bit that will effectively drill formations in the range between the hardest formations which can be drilled effectively by a toothed bit and the formations of extreme hardness in which a tungsten-carbide insert bit is used to best advantage. The circumferential teeth are combined with tungsten-carbide inserts imbedded between the teeth and on the gage.



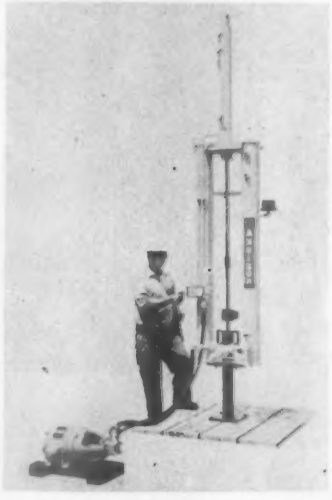
The bit offers a solution to the problem of drilling the unconsolidated formations of intermittent hard and soft strata found in many areas. **Contact Manufacturer: Reed Roller Bit Co., P. O. Box 2119, Houston, for details on YVC Comet series bit.**

●

Check valve with two poppets

. . . instead of the usual one is now being produced to provide low restriction to flow. The Reda Model AA check valve has a rubber-cushioned seat. Normal construction is Ni-Resist and stainless-steel parts in a steel housing. The operation is like that of a valve within a valve. With the movement of fluid, the poppets begin to open, dividing the fluid between the two poppets. As flow increases, the openings also increase to maintain the least resistance to flow. The maker claims the head loss is reduced as much as 75% of normal check valve loss. **Contact Manufacturer: Reda Pump Co., Bartlesville, Okla., for details on Model AA check valve.**

●



Packaged hydraulic pumping unit

. . . in a 24-in. size with a 3,500-lb. polished-rod load capacity is now being offered complete with electric motor for $700 f.o.b. factory. The unit is also available with a 5,000-lb. capacity for $775. Both units mount directly on the production tee, elimi-

---

Send this Showcase Coupon

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

Described in OIL AND GAS JOURNAL - Issue of July 27, 1959

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

A LETTER FROM SOHIO TO M. W. KELLOGG

"We are well pleased with the performance of this integrated unit. It has performed with fewer startup troubles than we had anticipated, and it has demonstrated considerably more operating flexibility than we had expected..."

(Signed) F. J. SANDERS, Engineering Manager
The Standard Oil Company (Ohio)
Cleveland, Ohio

The above is an excerpt from the letter of acceptance from The Standard Oil Company (Ohio) to The M. W. Kellogg Company for SOHIO's recently dedicated 60,000 BPSD refinery at Toledo. Kellogg is privileged to have been able to work with Dr. Sanders and the many others at SOHIO in making this highly integrated $40 million refinery an economic success. For those wishing to obtain the complete story on the project, write Kellogg for the SOHIO Kelloggram—a 20-page booklet devoted to the refinery's engineering, construction, and operation.

THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17, N. Y.
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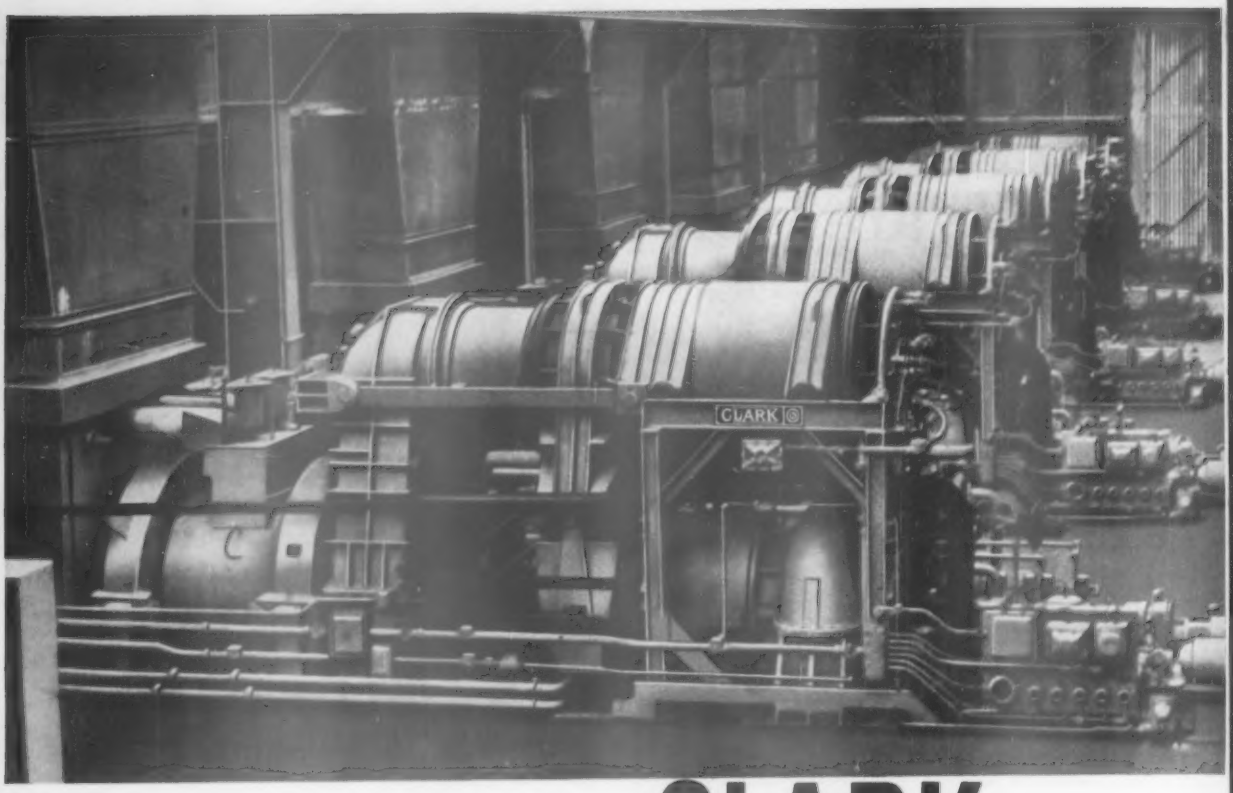


Five Clark Model 305 Gas Turbines drive Clark vertically-split centrifugal compressors operating in series. The station is highly automated with only two operators required per shift.

CLARK Gas 210,000,000

In the Arabian Desert...

At 'Ain Dar, Saudi Arabia, five Clark Model 305 Gas Turbines are driving Clark Vertically-Split Centrifugal Compressors for the gas injection program of the Arabian American Oil Company.

Surrounded on all sides by the torrid Arabian desert, the turbines and compressors are installed in a pressurized building to keep out wind driven sand. Available fuel for the turbines is sour gas while ambient temperatures soar to unusually high levels.

The 'Ain Dar injection plant draws gas from five gas-oil separator plants at a pressure of 125 psig, compressing it to 2100 psig for injection. Any four of the five series connected, turbine-driven Clark compressors can provide the necessary pressure ratio for injection. Maximum flexibility is achieved by the use of dual shaft gas turbines. An additional Model 302 turbine drives a 5600 KW generator to power the gas-oil separator plants.

Turbines Power Aramco SCFD Gas Injection Plant

Proved dependability, minimum maintenance and the low installation costs experienced by other users of Clark gas turbines were important factors in selecting the turbines and compressors for the 'Ain Dar plant.

The fact that some of the Clark turbines and compressors could be delivered from the Olean plant and the balance from Italy, was also of prime importance to Aramco.

Clark 305 and 302 gas turbines have a standard rating of 8700-9300 bhp. 1220 bhp. models are also available. Consult your Clark representative for your next gas turbine or centrifugal compressor project or write for descriptive literature.

CLARK

CLARK BROS. CO.
OLEAN, N. Y.
One of the Dresser Industries

COMPRESSORS • GAS TURBINES

New Equipment

nating the expense of foundations and costly installation.

The 24-in. Hydrax pumping unit is particularly suited for stripper-well application. The maker claims it can be installed and put into operation in 45 minutes. The units are capable of cycle rates variable to 6¾ c.p.m. **Contact Manufacturer: Axelson Div., U. S. Industries, Inc., 6160 South Boyle Avenue, Los Angeles 58, for details on 24-in. Hydrax unit.**

Long-life mud-pump piston

. . . just developed promises to reduce initial piston cost up to 40%. The body lasts indefinitely. The long life is achieved through the use of steel support rings with each set of rubbers.

The Four-on-One piston allows installation of four different rubber sizes on one piston body. A 5-in. body, for example, will accommodate 5, 5¼, 5½, and 5¾-in. piston rubbers. The piston comes in 5, 6, and 7-in. body sizes. With four different rubber sizes for each body, they cover

a range of liner sizes from 5 to 8 in. **Contact Manufacturer: Oil Well Supply Div., U. S. Steel Corp., Box 478, Dallas, Tex., for details on Four-on-One mud-pump piston.**

●

Pipe-welding machine for aluminum

. . . just disclosed successfully provides automatic circumferential butt welding. It is expected to greatly expand the use of aluminum pipelines in the petroleum industry.

When used to weld a joint, the machine is held in position by a strap clamp. The welding gun and cable-drum gear travel around the horizontal axis of the pipe. A 4½-in. pipe can be butt-welded in less than a minute, the maker claims. Production models of the machine are to be available soon. It operates with conventional engine-driven d.c. power sources. **Contact Manufacturer: Aluminum, Ltd., 630 Fifth Avenue, New York, for details on portable pipe welder.**

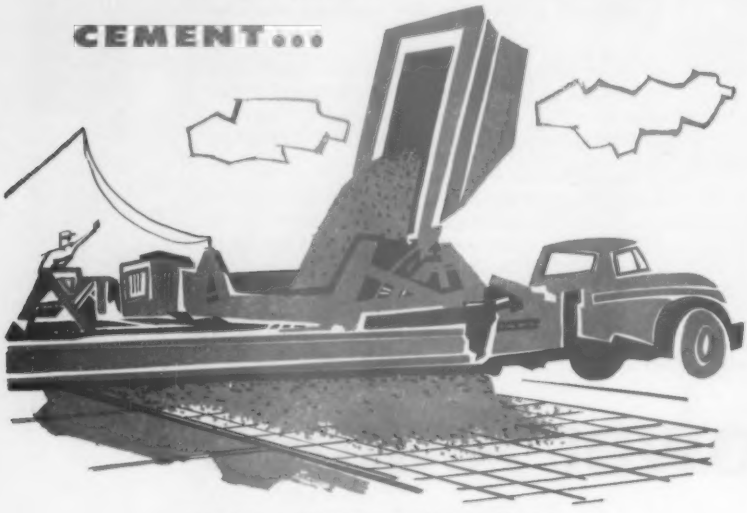
●

Packaged compressor for gas

. . . is available in three types, including a new 1,100-hp. package unit built around a GMXC series turbocharged engine-compressor. Other compressors using the GMXC unit

THERE ARE ALL KINDS OF

CEMENT . . .



BUT JUST ONE BEST

CEMENT ADDITIVE

FOR OIL WELLS!

ONLY Strata-Crete 6 ® TRADE MARK

GIVES YOU ALL 6

This improved perlite cement additive generally ***lowers fill-up cost,*** and is ***easier to place*** (requires only normal pump pressures). ***Superior bridging qualities*** and light weight assure complete fill-ups, and the greater resiliency ***reduces fracturing and shattering.*** Strata-Crete 6 can be used with ***any type or brand of cement*** and in itself is ***not affected by high well temperatures.***

Strata-Crete 6 can be obtained from your oil well cementing service company.

GLC ®

GREAT LAKES CARBON CORPORATION

MINING & MINERAL PRODUCTS DIVISION — STRATA PRODUCTS DEPARTMENT

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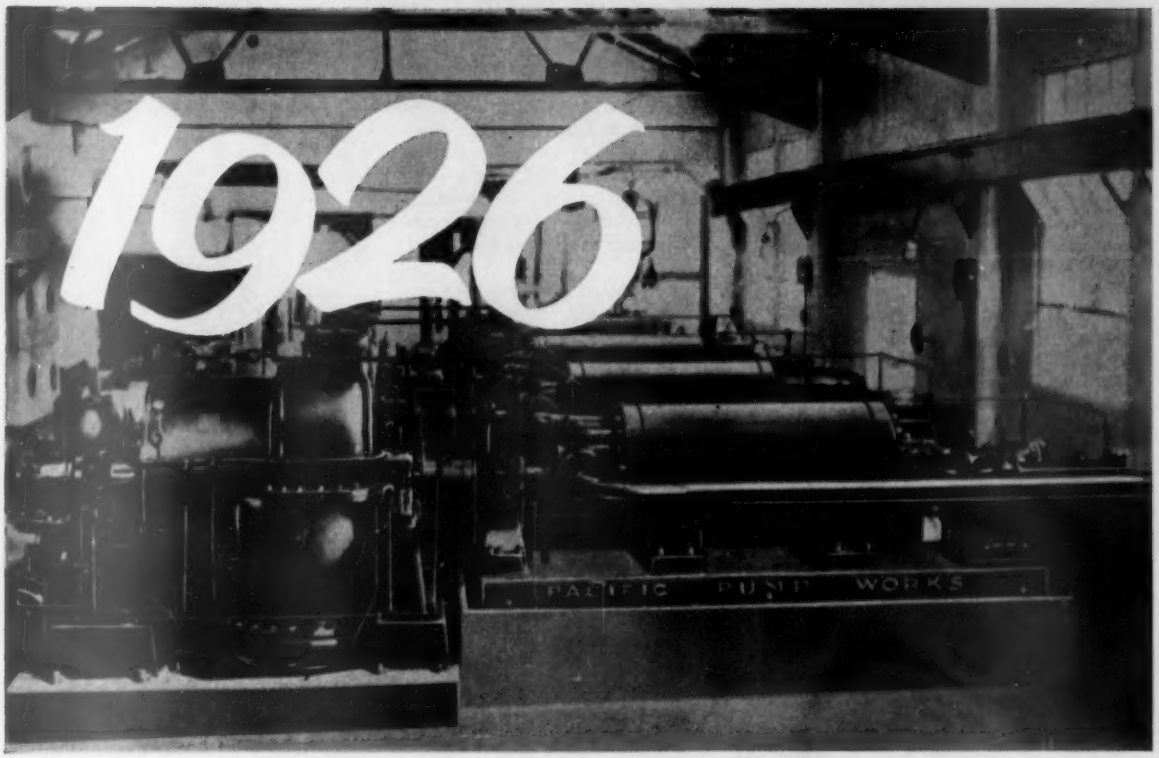


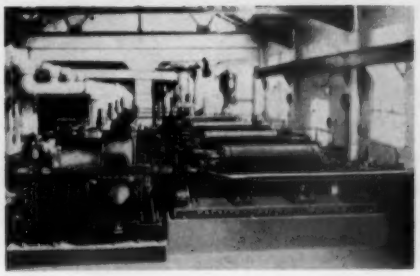
PACIFIC PUMPS

first "FIRST"

The centrifugal pumps designed and built for Pan American Oil Company's new high-pressure cracking process in 1926 was one of the most significant engineering achievements of the Twenties in the refinery processing field. The first of many Pacific Pumps' "FIRSTS", this particular pump was the forerunner of today's greatly improved Pacific centrifugal process pump line. Over the years Pacific has built and installed thousands of vertical and horizontal centrifugal pumps for extreme pressures and temperatures demanded by the petroleum, chemical, petro-chemical and allied industries. In addition, Pacific designs and manufactures boiler feed pumps for the power industry, steam turbo-pumps for the marine and power generation fields, and plunger pumps for oil-well service.

This first Pacific advertisement appeared in several petroleum publications early in 1927

2000 POUNDS PRESSURE WITH CENTRIFUGAL PUMPS



View of recent installation of four "PACIFIC" Multi-stage Pumps at Pan American Petroleum Company Refinery, Los Angeles. Each Pump delivers a capacity of 400 Gallons Per Minute of Oil against a pressure of 2000 pounds. Pumps are driven by 750 H. P. Steam Turbines. Each Pump weighs nine tons and was required to pass a hydrostatic test of 5000 pounds pressure.

We are prepared to make prompt shipment of Booster Pumps for Pipe Line or High Pressure service. Special Pumps designed for unusual conditions.

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350 Bicket Street Huntington Park Los Angeles, Cal.

Write for **Bulletin 1C**

PACIFIC

Offices in all Principal Cities

PACIFIC PUMPS

Inc. . . A Division of Dresser Industries, Inc.

HUNTINGTON PARK, CALIFORNIA

IN-1

are available in ratings from 440 hp.

The second type, DM-125, is an integral engine-driven compressor package specifically engineered for field gathering. Discharge pressures to 3,000 psi. are obtainable. This unit is capable of continuous unattended operation under severe field conditions, the maker says.

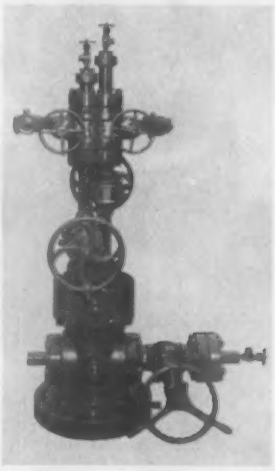
The third type is a low-horsepower compressor being packaged in two series. Series AM-2 is rated from 100 to 350 hp. and AM-4 from 250 to 500 hp. **Contact Manufacturer: C-B Southern, Inc., P. O. Box 19267, Houston 24, for details on packaged compressors.**

Tube-cooled totally enclosed motor

. . . designed for better heat transfer than possible with older motors is now available in ratings from 250 to 5,000 hp. The top section contains multiple tubes through which outside air is forced by a blower mounted on the motor shaft. Air inside is circulated over the tubes and cooled by heat transfer.

A shaft-mounted blower passes air through the cooling tubes at speeds of over 2,000 ft. a minute. The motor is expected to prove particularly useful in refineries and petrochemical plants where contaminated atmospheres exist. **Contact Manufacturer: General Electric Co., Schenectady 5, N. Y., for details on totally enclosed motor for contaminated atmospheres.**

●



Flange tree with flow control

. . . now in production is simple and flexible. One valve in the dual hookup can be removed without disturbing the other. Another advantage is that elimination of connections prevents leaks.

The J-E flow control on the Crescent flange tree combines an integral one-piece casting, a device performing the functions of a christmas tree cross or tee, wing valve, and an adjustable or position choke. **Contact Manufacturer: Oil Center Tool Co., Box 3091, Houston, for details on flange tree.**

●

Larger capacity field compressor

. . . is now being produced. The Model CFB compressor comes in ratings from 200 to 350 hp. It is a balanced/opposed type with a 5-in. stroke and two cylinders. It is engineered for either single or two-stage applications.

The unit is completely self-con-

For The "MR. CAP" They Chose a

Thompson . . . Perfect for Offshore Work!

On offshore rigs the reclamation of mud is vitally important and the separation of shale and abrasives from drilling muds means a more effective, time and money saving drilling job. Barnwell Offshore, Inc. chose Thompson for their new offshore rig, the MR. CAP, because it was field proven, will give them clean mud and make tools last longer, with a minimum of re-tooling and restoration of mud solution.

A Thompson Separator is your surest bet onshore . . . offshore . . . for shallow, medium and deep wells. The dependable Sample Machine works simultaneously with the separator, giving a foot-by-foot mud analysis with specimens. Write for Folder.

THOMPSON TOOL CO.
IOWA PARK, TEXAS

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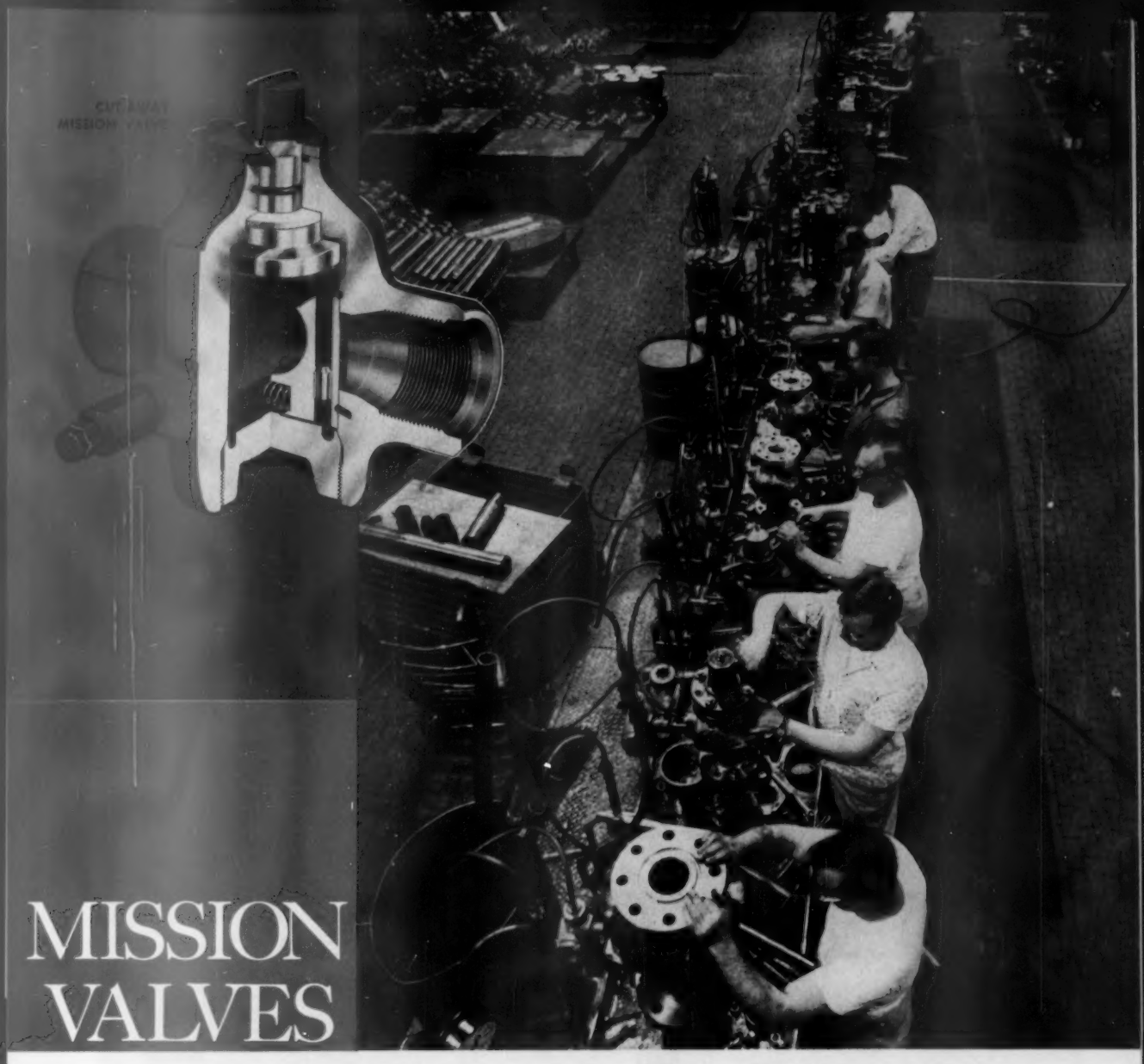

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protect you with a seal that works for you

Line pressure actually seals Mission Valves more tightly. The greater the pressure against the closed valve, the more tightly Mission Sealant holds—acting like a plastic packing. This automatic sealant injection system literally stops leaks before they start. This basic design, constantly improved upon, has been proved by almost twenty years in the field. Backed up by the modern manufacturing techniques of Mission's new Houston plant, you know you're getting quality. These are the reasons Mission Valves do what they're supposed to do, and do it for years with very little maintenance. There are more than 315 different valves, bringing the positive advantages of the Mission Valve to practically every application. Specify Mission and eliminate your valve problems.

For over thirty years-quality built in to last

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59-202

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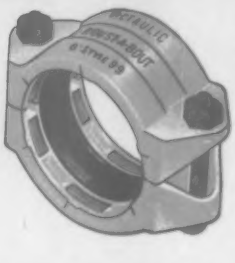
METHOD OF PIPING

VICTAULIC HAS EVERYTHING...

VICTAULIC COUPLINGS
Simple, fast, reliable. *Styles 77, 77-D,* for standard uses with steel or spiral pipe, — *Style 75* for light duty. Other styles for cast iron, plastic and other pipes. Sizes ¾" to 60".

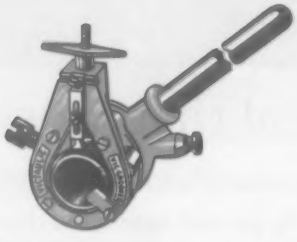


ROUST-A-BOUT COUPLINGS
For plain or beveled end pipe *Style 99.* Simple, quick, and strong. Best engineered and most useful plain end coupling made — takes a real "bull-dog" grip on the pipe. Sizes 2" to 12".

VICTAULIC SNAP-JOINTS
The new, boltless, speed coupling, *Style 78.* Hinged into one assembly for fast piping hook-up or disassembly. Hand locks for savings in time and money. Ideal for portable lines. Sizes 1" to 8".

COUPLINGS FOR EVERY PIPING JOB

VICTAULIC FULL-FLOW FITTINGS
Elbows, Tees, Reducers, Laterals, *a complete line*—fit all Victaulic Couplings. Easily installed — top efficiency. Sizes ¾" to 12".



VIC-GROOVER TOOLS
Time saving, on-the-job grooving tools. Light weight, easy to handle — operate manually or from any power drive. Sizes ¾" to 8".

PLUS FITTINGS AND GROOVING TOOLS

"EASIEST WAY TO MAKE ENDS MEET"

Promptly available from distributor stocks coast to coast.
Write for NEW Victaulic Catalog-Manual No. E-7

VICTAULIC COMPANY OF AMERICA
P. O. BOX 509 • Elizabeth, N. J.

tained and is suited for gas lift, gas boosting, repressuring, pressure maintenance, field gathering, and pipeline testing. It can be mounted on a barge, trailer, or concrete slab. All components are mounted on a steel skid. No job-site assembly is needed. **Contact Manufacturer: Clark Bros. Co., Olean, N. Y., for Bulletin 171.**

•

Portable geophysical cable reel

. . . now being manufactured can be worn on the chest leaving the operator's hands free for other uses. The reel is made of aluminum alloy and supported by neoprene-coated nylon webbing. The harness is designed to make the reel easily attached or removed.

Four widths of the reel are made. They range from 10 to 15 in. Using 3/16-in. wire, capacities range from 1,350 to 2,035 ft. Weights range from 7 lb. 11 oz. to 8 lb. 4 oz. **Contact Manufacturer: Tesco, Inc., 1403 East Fifth Court, Tulsa, for details on portable cable reel.**

•

Mud weigher handles foamy mud

. . . and lost-circulation material with no adverse effect on the accuracy or on the operation of the weighing unit. The new model of the Mud-O-Graf performs a weighing cycle every 45 seconds. The weighed sample is com-

need

ETHANOLAMINES and GLYCOLS?

this network of ALLIED distributors

means fast delivery

Wherever you are, chances are there's a distributor of Allied ethanolamines and glycols nearby. To serve you promptly and economically, local drum stocks are maintained by the distributors listed at right. Drum and tank car quantities are also available from Allied's Orange Texas plant. Shouldn't you make a note right now of the source nearest you?

1. Acid Products Co., Inc.—Chicago, Ill.
2. Acme Soap & Chemical Co.—Charlotte, N. C.
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4. Apothecaries Hall Co.—Waterbury, Conn.
5. Harry A. Baumstark & Co.—St. Louis, Mo.
6. T. H. Baylis Co.—Providence, R. I.
7. Denio Chemicals—Milwaukee, Wisc.
8. Chemical Sales & Service Co.—Worcester, Mass.
9. Chemical Services, Inc.—Atlanta, Ga.
10. Coastal Chemical Co.—Abbeville, La.
11. Cole & De Graf—San Francisco, Calif.
12. Geo. S. Coyne Chemical Co.—Philadelphia, Pa.
13. Crowley-Thompson Chemical Co.—Cleveland, Ohio
14. Delarich Corp.—Delawanna, N. J.
15. Dyce Sales & Engineering Service Co.—Billings, Mont.
16. Freeport Chemical Distributors—Cambridge, Mass.
17. Great Lakes Chemical Co.—Cicero, Ill.
18. Herbert Chemical Co.—Cincinnati, Ohio
19. Independent Chemical Co.—Brooklyn, N. Y.
20. Los Angeles Chemical Co.—South Gate, Calif.
21. Mine & Smelter Supply Co.—Denver, Colo.
22. O'Conner Chemicals, Inc.—Detroit, Mich.
23. Pacific Polymers—Hawthorne, Calif.
24. P B & S Chemical Co.—Henderson, Ky.
25. Plyco Products, Inc.—E. Boston, Mass.
26. Riverside Chemical Co.—No. Tonawanda, N. Y.
27. Southwest Gas Equipment Co.—Liberal, Kan.
28. Thompson-Hayward Chemical Co. (All offices listed below are Thompson-Hayward)

28A—No. Little Rock, Ark. 28B—Davenport, Ia. 28C—Des Moines, Ia. 28D—Wichita, Kan. 28E—Shreveport, La. 28F—Kansas City, Mo. 28G—Oklahoma City, Okla. 28H—Tulsa, Okla. 28I—Memphis, Tenn. 28J—Dallas, Texas. 28K—Houston, Texas. 28L—Lubbock, Texas. 28M—San Antonio, Tex. 28N—New Orleans, La.

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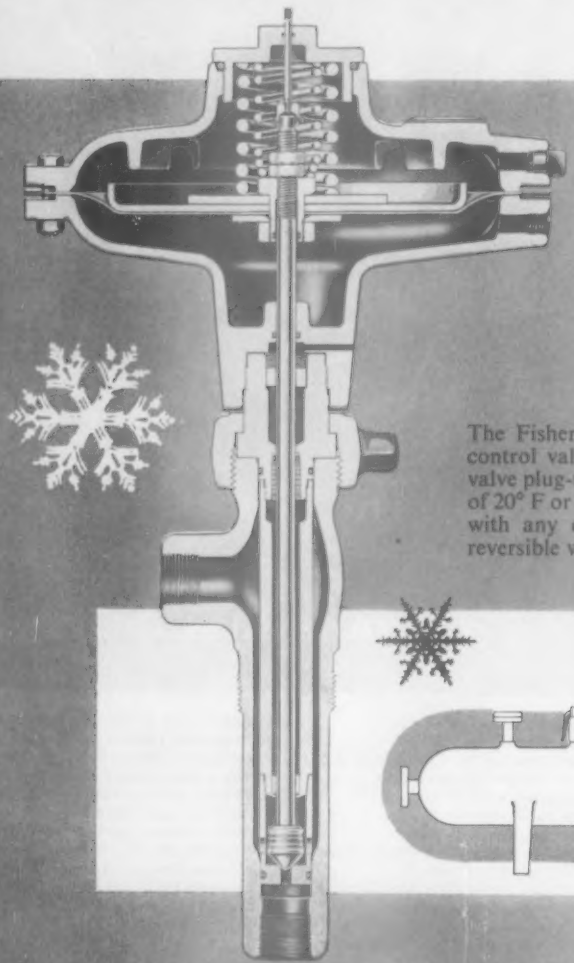
Dept. GA 4-55-3, 40 Rector St., New York 6, N. Y.

To reduce freezing hydrates and valve plug-up problems, look to the

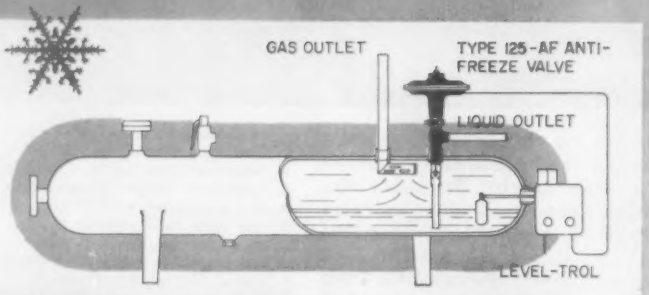
FISHER TYPE 125-AF

Anti-Freeze Oil Valve



- Longer body places orifice and inner valve deep in warmer gas phase.
- Heavy-duty cast steel body for 3000 psi working pressure; 1" angle female outlet and 2" male inlet connection.
- Inner valve and seat ring of hardened 440 stainless steel with orifice sizes of ¼", ⅜", ½" and ¾"
- Also available in Tungsten Carbide for highly erosive applications.

The Fisher Type 125-AF high pressure diaphragm control valve was developed specifically to prevent valve plug-up from freezing hydrates at temperatures of 20° F or below. The topworks can be interchanged with any other body in the series and action is reversible with no additional parts.



IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...

FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / London, England

BUTTERFLY VALVE DIVISION: CONTINENTAL EQUIPMENT CO., CORAOPOLIS, PENNSYLVANIA

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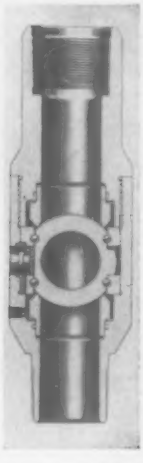
SINCE 1880

pletely flushed out before the next fresh sample is taken. The weighing unit can be installed to weigh mud coming from the hole as well as mud being returned to the hole.

Exceptional features include a new continuous chart record on the derrick floor with single-line recording that is easy to read and clearly visible to the driller. Accuracy of the mud-weight recording is kept at ½ of 1/10 lb. a gallon. The maker says rig vibration does not affect either the accuracy or general operation of the recorder. **Contact Manufacturer: Warren Automatic Tool Co., 3915 Tharp Street, Houston 3, for details on new Mud-O-Graf.**

●

Ball bearings ease valve operation



. . . under all pressure conditions in this new spherical type of plug valve designed for kelly cocks and drilling safety valves. The maker has used hydraulically balanced, spring-loaded seats mating with a hardened and precision-ground spherical plug to further ease valve operation and obtain positive sealing.

An enclosed grease-packed valve and bearing chamber protect the sealing surfaces. The product can be used as a standby safety valve for quick installation into open casing, tubing, and drill-pipe strings should a blowout threaten. **Contact Manufacturer: Hydril Co., 714 Olympic Boulevard, Los Angeles, Calif., for details on ball-bearing mounted spherical valve.**

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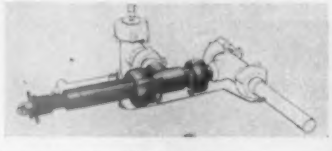
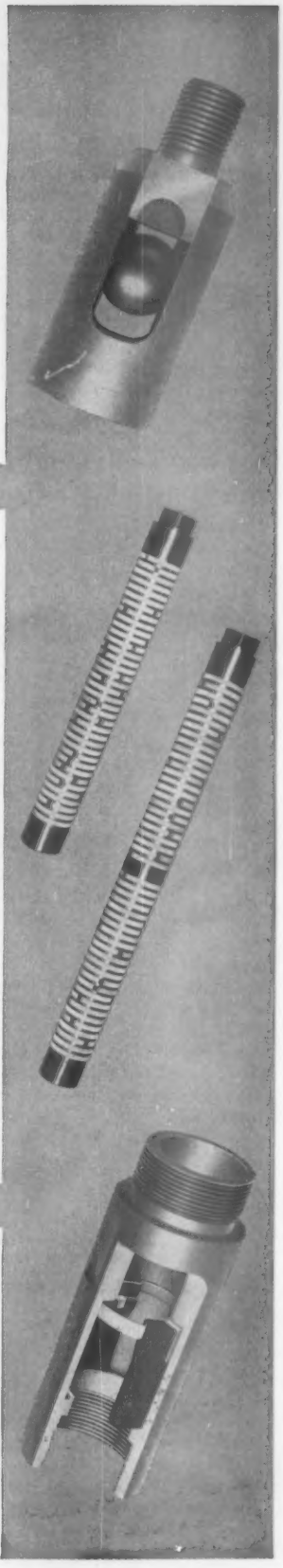


Automatic flow line safety valve

. . . just brought out gives the advantages of a conventional high-low safety valve. But instead of using spring or diaphragm actuation, the Unibolt Pressurematic valve uses two opposed pistons of selected diameters to establish a balanced condition between the wellhead and flow-line pressures. Any fluctuation of these pressures will

H-F
3
TUBE
BEST FOR SAND, ABRASION AND TEMPERATURE
• If you are producing some wells that are hard to keep pumping because of sandy fluid or trash or high bottom hole temperature, the next time you're in your supply store ask them to show you a Harbison-Fischer 3-Tube Rod Pump. • You can readily see that because the loose-fitting tubes use the fluid itself as the plunger sealing medium, entrained solids won't stick and bind the plunger nor score the barrel tube. Same for high temperatures; there's little chance for unequal expansion of the different metals to bind the pump. And if you want to pump your wells faster, the free-falling action also allows a greater strokes-per-minute rate—without being hard on the rods. H-F 3-Tube Rod Pumps are available for 2" through 4" nominal tubing, in lengths to 25'. • For hard-to-pump wells—or as an efficient, all-round pump for average wells—you can depend upon the H-F 3-Tube to make good production without frequent pulling jobs. Ask your store, one of our more than 50 factory representatives, or write to us at Box 127 in Fort Worth for an illustrated bulletin. There's no obligation, of course.
"BEST PUMPS IN THE OIL PATCH"
HARBISON-FISCHER
MFG. CO. • FORT WORTH

Getting Value Received is a prime requirement in your efforts to REDUCE LIFTING COSTS. Giving value received has always been our prime objective.



THE MARTIN PLUNGER is valuable to you because it can be used over and over by replacing only the rings — plus the bonus of longer tube life, due to slower wearing action of the resilient rings.

THE MARTIN RUBBER GUIDE CAGES are valuable to you because of their remarkable lasting qualities — plus the bonus of improved Ball & Seat life.

"Worth their weight in Gold" would not be an exaggeration, in some cases of extreme savings with these products.

IMMEDIATELY AVAILABLE . . . in all sizes and styles from our Tulsa plant. Sold by all supply companies and stocked at many points. Fully detailed in Composite Catalog, except for recent improvements mentioned below.

The Plungers illustrated are our new standardized 1½ ft. and 2 ft. lengths which screw together to make longer (Box & Pin, cage thread) plungers. You meet many requirements with just a few pieces. Readily interchangeable.

"Extra Clearance" cage guides are now available to give extra ball clearance for large foreign particles, such as Frac Sand, Gyp particles, scale and for viscous fluids. Readily interchangeable or replaced.

JOHN N. MARTIN

Manufacturer

9 W. BRADY STREET • TULSA, OKLAHOMA

When you see this being done-

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"500 TON"

USED on more wells throughout the world-wide drilling industry!

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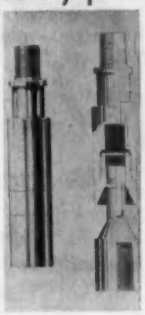
cause the pistons to move. Movement in the valve is limited to the closing direction.

The valve can be used as a manually operated wing valve and adapted to remote-control devices for use either as a shutoff wing valve or as an automatic valve. Made of stainless steel, the valve can be attached to any regular 2-in. tee-type Unibolt wing valve body or positive choke body. **Contact Manufacturer: Thornhill-Craver Co., P. O. Box 1184, Houston, for details on Pressurematic valve.**

•

Shear disk releases safety joint



. . . for swab lines at a predetermined load. The Raydon swab-line safety joint comes with positive release points of 11,000, 13,000, and 15,000 lb. shear.

The safety tool offers a way to eliminate loss of line overloading equipment and lost time waiting for a wireline cutting tool. After release, it provides a fishing neck centered in the hole for easier recovery of the swab. **Contact Manufacturer: Merla Tool Corp., Box 2576, Dallas, Tex., for details on Raydon swab-line safety joint.**

•

World's largest p.d. meter

. . . has been recently built. The B-142 BiRotor meter stands 9 ft. high and measures 20,000 bbl. of oil an hour at 150 psi.

The meter is suited to the measurement of either crude oil or refined products at rated capacity. **Contact Manufacturer: Ralph N. Brodie Co., San Leandro, Calif., for details on B-142 meter.**

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GOING FISHING? ACME CALL YOUR FRIEND!

Save dollars 4 ways with UNICOR®

1. Maintain flow capacity

Unicor prevents corrosion in pipelines—keeps pipelines free of scale. With Unicor you are assured of maintaining maximum flow capacity, C factor and output.

2. Reduce downtime

Downtime to scrape lines and replace filters is production time lost. Prevent such loss with Unicor. It keeps equipment free of products of corrosion.

3. Cut filter replacements

What's your annual bill to service and replace filters? A pretty penny, no doubt. You can drastically reduce this expense by using Unicor.

4. Increase equipment life

Tanks, vessels and pipelines stand up longer when you give them effective protection against corrosion. A little Unicor goes a long way—protects against corrosion from well to consumer.

Unicor, the preferred oil-soluble corrosion inhibitor, can be added to your product at any point in your operation. Costs less than a tenth of a cent per barrel of product. Write our Products Department for detailed information. Ask about samples and how to test them.

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SHOWCASE . . .

New Literature

Trip valve, regulator bulletins

. . . are now available, free for the asking. Bulletin 124 describes the Type 299 pressure regulator for reducing applications. The semibalanced, single-seat, angle-type regulator is designed to give trouble-free service under severe conditions at wellheads and in gas-field collecting and transmission lines.

Bulletin 170 describes the Type 196 differential-operated trip valve. It's designed for use on transmission lines, at section valves, and at regulator and compressor stations to isolate line breaks. According to the literature, it has a wide range of protective applications, such as safety air shutoffs on kilns.

The cast bronze, manual reset, snap-action valve operator is tripped by a differential pressure taken from an orifice or valve. **Contact Manufacturer: Advertising Dept., American Meter Co., 920 Payne Avenue, Erie 6, Pa., for Bulletins 124 and 170.**

Marine power and steering packages

. . . are outlined in new Bulletin 596, now available. It gives specifications of the models, which range from 40 to 500 hp., gas or diesel. The 12-page publication features several photos of units in action, showing their maneuverability and performance. **Contact Manufacturer: Murray & Tregurtha, Inc., 80 Hancock Street, Quincy 71, Mass., for Bulletin 596.**

Sealed ratchet-lever hoist

. . . information is provided in an obtainable four-page bulletin. It illustrates and describes five new models. Two-color Bulletin ADH-78 includes specifications and features of the models, with capacities ranging from ¾ to 6 tons. **Contact Manufacturer: Coffing Hoist Div., Duff-Norton Co., Danville, Ill., for Bulletin DH-78.**

Portable lighting equipment

. . . known as String-a-lite lighting—for oil and gas derricks, masts, and other equipment—is outlined in new Bulletin B75, free for the asking. The eight-page publication contains information on assemblies for all types of masts and rigs.

Major component parts include derrick lights, floodlamps, distribution centers, connectors, extensions, and

Another plus value:

INHERENT LUBRICATING QUALITIES BROADEN USE OF SEECO-MUL AS E-P ADDITIVE

On your next well, try Seeco-Mul Drilling Mud Emulsifier as an extreme pressure additive. Many operators have recently discovered this extra advantage in Seeco-Mul; in fact we can show you data on a number of field wells drilled under almost identical conditions that will convince you that Seeco-Mul is the most effective E-P agent you can use.

The efficiency of Seeco-Mul as an E-P agent is due to its chemical structure—the ability of one end of the Seeco-Mul molecule to adhere tightly to a metal surface, attracting another molecule to form the familiar micelle, or the joining of two molecules at opposite ends. This layer attracts other Seeco-Mul molecules, which build up to an extremely tough lubricating film that is difficult to remove and will withstand high pressure, successfully reducing metal-to-metal contact and subsequent wear, or galling, of the bearing surfaces.[1]

In addition to the E-P qualities, you get many other advantages with Seeco-Mul. Inasmuch as Seeco-Mul is a chemical emulsifier with superior wetting abilities, it is often run in so-called "soap" drilling fluids (the addition of detergents to fresh water muds, oil-and-water, and water-clay systems) to lower the surface tension, thereby wetting the formation ahead of the bit and keeping the bit clean. Such systems also afford a faster penetration rate and aid the suspended solids to drop out in the pits.

Too, with good lubricating qualities in the mud, less drill stem torque is required, pump pressures can be lowered and more evenly sustained, and a higher velocity of the fluid on bottom can be obtained . . . all of which means longer service life for liners, collars, tool joints, drill pipe, and the bits themselves.

Add to this the longer bit runs and the consequent savings in bits and rig time and you will agree that adding Seeco-Mul to the system is an investment rather than a drilling expense.

Let us show you how you can use Seeco-Mul profitably. We'll gladly send you illustrated literature and a lab sample of Seeco-Mul, or contact your local mud dealer. You can get full particulars without obligation.

[1] *McCutcheon, John W., "Synthetic Detergents."*

Make a good mud better...use

CROSSETT **Seeco-Mul** **DRILLING MUD EMULSIFIER**

Manufactured by the Chemical Division of The Crossett Company, Crossett, Arkansas

Seeco-Mul is the dried flake form of a compound of the sodium salts of abietic, linoleic, and oleic acids, together with quantities of wood tannins and lignins.

600-foot length of Thermoid-Quaker hose, self-propelled both off and on the reel, floated on inflatable rubber "sausages."

Quaker Thermoid floating ship-to-shore rig helps speed oil storage for new arctic air base

Increased air traffic over the polar route has called for an immense new airfield and oil-piping system at Frobisher Bay, Baffin Island, just completed by Foundation Company of Canada Limited.

Tankers pump petroleum products through a 600-foot Thermoid-Quaker Floater Hose assembly to a 15,000-foot pipeline feeding the huge tank farm at Frobisher. An 8" Thermoid-Quaker discharge hose is floated on special inflatable Thermoid-Quaker pontoons and reeled on a power winch. This three-part rig makes up the complete Thermoid-Quaker assembly.

You do away with bulky metal drums for floating hose when you use this new Thermoid-Quaker rig. Inflatable floats take up less than a quarter of the space formerly required by floating drums. And the hose comes in such long sections that couplings are reduced by as much as 90%.

If you load or unload tankers off-shore, investigate the Thermoid-Quaker Floater Hose combinati n. Ask the Thermoid distributor, or write *Thermoid Division, H. K. Porter Company, Inc., Tacony & Comly Sts., Philadelphia 24, Pa.*

THERMOID PORTER DIVISION

H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY DE MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

feeder lines. **Contact Manufacturer: Electrical Products Div., Joy Mfg. Co., 1201 Macklind Avenue, St. Louis 10, for Bulletin B75.**

Vapor-conservation breather balloons

. . . are noted in a new publication, which lists various sizes and specifications. Breather balloons are made of synthetic rubber-coated nylon. They are used for preventing vapor losses in the storage and transfer of gasoline and gases. **Contact Manufacturer: Vulcan Rubber Products Div., Reeves Brothers, Inc., 1071 Avenue of the Americas, New York City 18, for Vapor-Conservation Breather Balloons brochure.**

Gyrol fluid drives

. . . applied to pipeline pumping stations for pipeline flow control, are illustrated in new Bulletin A519. The two-color publication outlines advantages of the adjustable-speed Gyrol units in flow-control applications.

Operating principles are explained and illustrated with an easy-to-understand schematic section drawing of a typical adjustable-speed fluid drive. Curves in Bulletin A519 chart the economy of the drive versus constant-speed drive with throttling control of flow.

Both line and pump characteristic brake horsepower and pressure curves are shown for a broad range of pipeline-flow requirements. The literature gives three types of oil coolers for use with the drives and includes tabular data to permit preliminary fluid-drive selection.

Dimensional data and photos of typical applications are included. **Contact Manufacturer: American Standard Industrial Div., American Radiator & Standard Sanitary Corp., Detroit 32, for Bulletin A519.**

Catalog illustrates rock bits

. . . including the K-type and Hole-Maker models, and it's now available, free upon request. The publication gives available sizes and specifications of many bit designs. It includes recommended use of each and general plant information. **Contact Manufacturer: Oil Tool Mfg. Co., Inc., P. O. Box 24, Tonkawa, Okla., for Rock-Bit catalog.**

Digital-computer folder

. . . gives particular emphasis to the magazine-loaded photo-tape reader, which is offered as standard equipment on the computer. The six-page publication includes descriptions of: (1) two programing systems; (2) ac-

cessory punched-card, magnetic-tape, and paper-tape equipment; (3) several special-purpose devices; and (4) computer specifications. **Contact Manufacturer: Computer Div., Bendix Aviation Corp., 5630 Arbor Vitae Street, Los Angeles 45, for Bulletin AB-059.**

Open-flooring Bulletin 2527-R

. . . defines advantages of the flooring as safe, permanent, and easy to maintain. The 24-page literature describes and illustrates use of open flooring—or electroforged grating—in various industries, and features grating applications.

Information includes types and spacing, bearing-rod surfaces and weights, fastening methods, and safe loads for electroforged carbon steel and aluminum interlock grating. The bulletin includes information on stair treads. **Contact Manufacturer: Grating Dept., Blaw-Knox Co., Blawnox P. O. Box 1198, Pittsburgh 30, for Bulletin 2527-R.**

Manufacture of steel-line pipe

. . . ranging in sizes from ½ through 36-in. diameters, is described in an available, 40-page brochure. It's divided into sections dealing with three types of line pipe: (1) continuous weld pipe with ½ through 4-in. diameters; (2) electric-resistance weld pipe with diameters from 4½ through 18 in.; and (3) electric-weld pipe with diameters from 20 through 36 in.

Each section includes descriptions, pictures, and flow diagrams, showing the manufacturing sequence for each type of pipe. The brochure also includes line-pipe data tables, which show weight per foot, wall thickness, test pressures for API-5L and API-5LX, and tons per mile. **Contact Manufacturer: Tubular Sales Dept., Kaiser Steel Corp., P. O. Box 58, Oakland 12, Calif., for Line-Pipe brochure.**

How deep can a well be drilled?

. . . is the title of an illustrated leaflet, which gives particulars on all world's record-depth wells below 15,000 ft. The literature quotes a panel of engineers who state that American drillers "can reach 50,000 ft. if the necessity arises."

The leaflet contains a photograph of Col. Drake in front of his historic well, and includes pictures made during the drilling of the six wells that established successive world's depth records since 1947. The present record, established last year, is 25,340 ft. **Contact Manufacturer: National Supply Co., Two Gateway Center, Pittsburgh, for How Deep Can a Well be Drilled? leaflet.**

Facts about plastics

. . . is the title of a pocket-size booklet, which compares outstanding properties and typical industrial applications of 13 major plastic families in common industrial use.

The four-page publication discusses acrylic, Implex, nylon, Teflon, polyethylene, flexible and rigid vinyl, cellulose acetate, butyrate, polystyrene, high and medium-styrene, phenolic, and fibrous glass-reinforced polyesters, and epoxies.

The booklet corrects five major misconceptions about plastics. It also summarizes material presented in an educational program dealing with plastics. **Contact Manufacturer: Cadillac Plastic & Chemical Co., 15111 Second Avenue, Detroit 3, for Facts About Plastics booklet.**

Dual-Beam microwave equipment

. . . offers additional protection against communication failures, reports Bulletin ECM 91, now available. The protection is afforded by exceeding techniques usually found in automatic standby equipment.

According to the literature, cross polarization of antennas makes continuous parallel operation of two sets of RF equipment possible, thus increasing reliability of the total system. **Contact Manufacturer: Communication Product Dept., General Electric Co., Lynchburg, Va., for Bulletin ECM 91.**

Special-coated plug valves

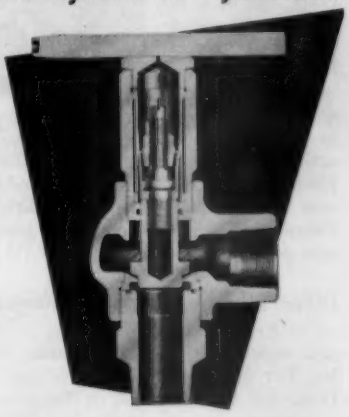
. . . are featured in eight-page photo-illustrated Bulletin V-614. Coatings include K51 (Penton), Kanigen, and Teflon, in addition to other corrosion-resistant valves. The literature gives descriptions of coating properties, valves available, tables of recommended applications, and illustrations showing typical installations.

Penton is a new thermoplastic polymer that provides chemical resistance to both organic and inorganic agents. It's recommended for service in temperatures up to 200° F.

Kanigen-coated valves have a uniform, hard, corrosion-resistant nickel-alloy coating. Teflon coating is available on the plugs of the illustrated valves. **Contact Manufacturer: Meter & Valve Div., Rockwell Mfg. Co., 400 North Lexington Avenue, Pittsburgh 8, for Bulletin V-614.**

NEW from KINZBACH

a Long Life Manual Reset Relief Valve for Hydraulic Systems



This field proved safety valve for hydraulic systems delivers instantaneous relief at full capacity

Designated the Model 115, this manually reset relief valve has these outstanding features:

A piston-type shut-off with easily replaceable piston and seat with molded-in seal.

A bumper ring assembled on the piston and capable of absorbing the energy of impact as the piston moves to the "open" position.

An adjustable restraining means holding the piston in the "closed" position until set pressure is exceeded.

Restraining elements may be adjusted for any set pressure within the range of the valve.

A reset punch attached to the cylinder cap.

Functional testing for full system protection, since restraining elements are not destroyed at each action.

KINZBACH TOOL CO INC

Remember, for better relief valves, specify Kinzbach. Write today for detailed catalog on this and other relief valves.

KINZBACH TOOL CO., INC.

P. O. Box 277 Houston, Texas

Export: 74 Trinity Place, New York, N.Y.

Fred B. Crandall is appointed

. . . general sales manager for T. D. Williamson, Inc., Tulsa. Crandall joined the firm 7 years ago as a research and development engineer. He was appointed factory sales engineer for the upper Great Lakes area in 1956, and early this year was made acting general sales manager. Before joining T. D. Williamson, Crandall was a pipeline engineer with Phillips Petroleum Co. in the company's products pipeline department.

Diller is named sales manager

. . . at Fritz W. Glitsch & Sons, Inc.'s new regional office in Charleston, W. Va. For the past 9 years, William C. Diller has been engaged in the chemical-process industry in the Charleston area.

The Charleston office is one of 10 regional offices maintained by Giltsch in the United States and Canada. The Dallas firm manufactures fractionation trays and pressure vessels for the petroleum refining and chemical-processing industries. Plants are located in Dallas and Uxbridge, Ont.

Warehouses are established

. . . at Fort Morgan, Colo. and Green River, Wyo., by D&M Oil Field Specialty Co., for sales and service headquarters of B&W, Inc. and Davis-Lynch, Inc. Ralph Phillips is owner and manager.

Five Executive Assignments Are Made

. . . by Schlumberger Well Surveying Corp., including the promotion of Louis E. Magne from southwest area manager in Houston to vice president of operations of Societe de Prospection Electrique. The latter organization is Schlumberger's operating company for Europe, the Middle and Far East.

The promotion will return Magne to his native France, as headquarters of the European company are in Paris. Magne has served Schlumberger in Rumania, Venezuela, and in several United States locations.

Alan Morazzani, former Rocky Mountain area manager in Denver, takes over as the new southwest area manager. He joined the concern in 1935 and served in Venezuela, Texas, and Louisiana. He was division manager at Midland, area manager in Evansville, and Rocky Mountain area manager.

W. R. (Bill) Mills, Jr. has been promoted to Rocky Mountain area manager. After starting with the company in 1937, Mills served as field engineer, assistant manager of the southwest area, and manager of the South Texas division at Corpus Christi.

L. C. Chappel is now manager of the Oklahoma division with headquarters in Oklahoma City. Most recently he was assistant to the vice president, Schlumberger of Canada. After joining the company in 1948, he served at Ardmore and Pawhuska, Okla., and Wichita, prior to transfer to Regina, Sask., where he was Eastern Canada division manager. Later, Chappel was stationed at Edmonton as Western Canada division manager.

J. L. Heath has been assigned as assistant to the manager of the Mid-Continent area at Tulsa. Formerly he was Oklahoma division manager. Heath joined Schulmberger 12 years ago. He replaces E. A. Colle, who has been transferred to Corpus Christi.

B. D. Coyle is appointed

B. D. Coyle

. . . sales representative in the Tulsa home office of Midwestern Pipe Line Products Co., reports John Wilson, vice president. Coyle previously was with F. H. Maloney Co., where he served in various sales capacities.

Craig Smyser is named veep

. . . in charge of special projects and services, for Continental-Emsco Co., a division of Youngstown Sheet & Tube Co., Dallas. Smyser previously was vice president in charge of operations for Paul Hardeman, Inc., of Los Angeles.

Smyser served as district engineer at Denver for the U. S. Army, and in 1952 was appointed director of engineering and construction for Panama Canal Co. He retired from the army in 1954 as a colonel in the Corps of Engineers.

HEAT-TRANSFER DESIGN seminar was held recently for a group of process engineers at the Conrad Hilton Hotel in New York City. Dr. Donald Q. Kern, nationally known expert on thermal design and application, conducted the sessions. The seminar was one of a series held throughout the country under the sponsorship of Wolverine Tube Division of Calumet & Hecla, Inc.

Odex transfers Bob Dozier

Bob Dozier

. . . to Corpus Christi, Tex., where he will take over as South Texas division manager. He formerly was a sales engineer with Odex Engineering Co.'s Odessa, Tex. office.

Dozier is being replaced in the Permian Basin area by Jim Chism, formerly with National Tank Co. in Midland, Tex.

George L. Reid takes over

G. L. Reid

. . . the newly created position of administrative assistant to J. V. Spalding, general sales manager of Bethlehem Steel Co.'s Supply Division at Tulsa. He will act as liaison between sales and manufacturing departments of the Supply Division. Reid has been with Bethlehem for over 20 years in production-equipment sales, and has been assistant manager of machinery sales on production equipment for the past 10 years.

C. R. McNair

F. C. Underwood

In other appointments, C. R. McNair was named sales manager of production equipment, and F. C. Underwood was made sales manager of secondary-recovery equipment.

McNair joined Bethlehem at Tulsa in 1948, and was promoted to engineering representative the following year. He was transferred to the Gulf Coast division office at Houston in 1955, and promoted to division machinery-sales representative. Three years ago, McNair was promoted to manager of the West Texas-New Mexico district at Midland, Tex., and held this post until the new assignment.

Underwood was employed by Bethlehem at Tulsa in 1950, and was promoted to machinery-sales representative in 1951. He has worked primarily on sales of secondary-recovery equipment and specifically on waterflooding projects since joining the organization. Underwood will now head up the newly created department on secondary-recovery equipment sales.

William S. Cook is named sales

. . . representative for Leschen Wire Rope Division, H. K. Porter Co., Inc., according to Rex Hartup, general sales manager. His territory includes northern Illinois, southern Wisconsin, and eastern Iowa. Cook's previous experience was with Gates Rubber Co. and Dresser Mfg. Co.

Ralph Discus joins Franks Div.

Ralph Discus

. . . of Cabot Shops, Inc., Pampa, Tex. He will be a sales representative working out of Oklahoma City. Discus formerly was with Cardwell Mfg. Co. and Wilson Mfg. Co., covering the United States and Canada. The new representative will be working with John Leyh, Franks district manager for the Mid-Continent area, with headquarters in Tulsa.

Bechtel directors elect Rankin

. . . to vice president of the corporation. A 25-year veteran of Bechtel Corp., Clark Rankin has been active in planning, constructing, and managing many of the company's key projects, particularly overseas.

Lindeteves-Jacoberg, N. V.

. . . located at The Hague, Netherlands, will act as Houdry Process Corp.'s representative for DABCO, a new one-shot polyether catalyst used in producing urethane foams and elastomers, in the Benelux nations and in the United Kingdom, and the Union of South Africa.

Plasticap coated pipe keeps the pipe down and the profits up!

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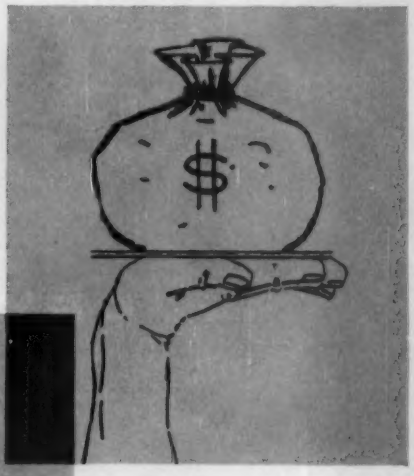

Don't take chances with expensive tubing! Make sure it's resistant to acids, alkalines, paraffin, deposition, salt water—and you'll keep the well (and your profits) flowing.

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Jet aircraft now get a new and wider safety margin when their fuels are dried with LINDE Molecular Sieves. Even at high fuel flow rates, water normally absorbed at ground level is reduced to less than 10 ppm — eliminating ice-blocked fuel lines at high altitudes.

Liquids never before dried-successfully by desiccants can now be dried commercially with these new zeolite adsorbents. Examples are acetone and other ketones, ethanol and other alcohols, and most saturated and unsaturated hydrocarbons. Drying to less than 1 ppm is now practical in dynamic systems. Due to their high water adsorbing capacity, LINDE Molecular Sieves bring pronounced savings in investment and operating costs.

No matter what the liquid — whether attempts to dry it have succeeded or failed — we would like to discuss with you what a Molecular Sieve design can do.

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Iverson Supply Co. opens

. . . a new sales office in Houston, and appoints Vern Cutchall the company's Houston sales representative.

The office was opened to provide a greater service to Iverson customers. Cutchall has had more than 10 years experience in the oil industry, chiefly as a sales representative.

W. Roy Davis is named manager

W. Roy Davis

. . . of the Pressure Control Equipment Division of Cameron Iron Works, Inc., reports Herbert Allen, vice president and general manager of the firm. Davis formerly was sales manager of the Valve & Oil Tool Division, which is being replaced by the Pressure Control Equipment Division.

Davis' new division consolidates domestic manufacture, engineering, and sales of all Cameron pressure-control products, including well heads, blowout preventers, valves, and instruments.

John H. Grubb will continue as manager of the International Division, with responsibility for equivalent activities outside the United States.

E. V. Aldridge is named veep

E. V. Aldridge

. . . in charge of sales at Appleton Electric Co., reports Arthur I. Appleton, president of the Chicago concern. Assistant vice president of sales for the past 3 years, Aldridge has been with the company since 1950. Other appointments announced by Appleton include: Phillips M. Darby, general sales manager; John P. Dwyer, sales manager, Unilet Division; Thomas A. Strock, sales manager, Reelite Division; George E. Steinmetz, sales manager, Illinois Malleable Iron Co., another Appleton division; F. W. Wehrheim, vice president, directing executive level planning for company operations; and S. Peter Lambros, vice president of administration and planning, a new post.

Harold G. Blassey is assigned

. . . to the New York domestic branch office of Cooper-Bessemer Corp., reports George Edick, sales manager, domestic division. In this capacity, Blassey will work under the direction of C. J. Havekotte, New York branch manager, on the application and sale of Cooper-Bessemer engines and compressors. Blassey formerly was with Clark Bros. Co.

Walworth names Dee Hammond

. . . to the post of division manager over the Los Angeles area, where he will be responsible for administration of Walworth interests in one state and parts of two others.

Hammond previously was assistant division manager of Walworth's Gulf Division. He also worked as a rubber engineer for Goodyear Tire & Rubber Co. Before that, he was employed as sales manager by Sabine Supply Co.

George J. Fix Co. is appointed

. . . exclusive sales agent in the North Texas area for fast couplings of Koppers Co., Inc.'s Metal Products Division. Complete stocks of couplings ranging up to 5,000 hp. ratings will be available at Fix Co.'s Dallas and Fort Worth stores.

Use THREE-PHASE MOTORS on SINGLE-PHASE CURRENT!

"IMPOSSIBLE"

—they said.

But H-A-S does it!

Even in this atomic-age, with the impossible being accomplished every day, there are still skeptics. There are those who say you can't use three-phase motors on single-phase current—*but H-A-S does it every day* for scores of satisfied users, including independent and major companies throughout the oil country.

For these open-minded, profit-wise men the H-A-S System is saving money at every turn. Three-phase motors cost less, operate for less, and can be used later on three-phase service. The H-A-S Phase conversion system permits the use of three-phase motors from 3 h.p. up to 75 h.p.—and is available in two models, for motor mounting or remote mounting.

If you have 220 V. single-phase current for power, and are interested in saving money—WRITE NOW for complete details and the name of our nearest sales and service distributor.

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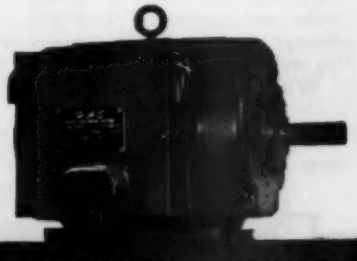

H-A-S PHASE CONVERSION SYSTEM

Western Co. promotes seven

. . . according to Walter Beadle, executive vice president of Western.

George Eng, former Midland, Tex. city sales manager, is now Midland division sales manager. Jean Barrett has been named to a similar post for Western's Oklahoma City division. He formerly was in charge of Fort Worth metropolitan sales.

Mike Adams, former district manager at Seagraves, Tex., will assume duties of division engineer for the Midland division. Adams' former post has been taken over by Frank Bruner, who was sales supervisor of the Seagraves district. Cecil Dobbs moves from the firm's Andrews location to take over as Seagraves sales supervisor. He was sales engineer at Andrews.

Bob Peacock is the new district manager at the Rankin, Tex., district, after moving from the position of sales supervisor of the Kermit, Tex. district. Bob McMillan moves from Monahans, Tex. to assume the Kermit duties as sales supervisor. Bob Cocanower has been named to the metropolitan sales duties in Fort Worth from his former position as sales engineer in Midland.

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...at any depth!

The deeper your well, the more important correct counterbalance becomes.

Even small changes in well conditions can result in power waste and unnecessary wear and damage to equipment if a pumping well is not properly balanced.

With a JENSEN Rotary Balanced JACK the adjustment of the counterbalance is such a simple one-man job there is no excuse for any well ever being improperly balanced—whether it is deep or shallow.

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JENSEN JACKS

Halliburton adds a new director

. . . and advances three other executives, announces Logan D. Campbell, chairman, following the company's annual meeting of stockholders, and a directors' meeting at Duncan, Okla.

W. D. Owsley

M. K. Brummett

William D. Owsley, senior vice president, was elected a director, following stockholder approval of a proposal permitting enlargement of the board. Marvin K. Brummett, secretary, was elected vice president and secretary.

J. P. Harbin

J. E. Thomson

John P. Harbin was elected financial vice president, a new position. He formerly was controller and assistant secretary. J. E. Thomson was elected controller and assistant secretary.

Owsley joined Halliburton Oil Well Cementing Co. in 1932, and has since held engineering and technical responsibilities. Harbin started with Howco in 1948 after financial posts with Carter Oil and Creole Petroleum in domestic and Venezuelan operations.

Brummett, who joined the firm's legal department in 1938, most recently had been assistant general counsel and company secretary. Thomson, a 14-year company employe, most recently was chief accountant.

Chicago Bridge & Iron reveals

. . . plans to add a 100 by 500-ft. building and a "pickling" facility to its plant near Houston. A CB&I spokesman said the construction would complete a $1 million expansion program started 2 years ago.

The new building will house the plant's fabricating and erecting equipment. The pickling facility will be used to remove excess mill scale from steel plates and shapes used in the fabrication of large-capacity storage vessels and processing equipment.

Welex of Canada, Ltd. reports

H. T. Harvey

. . . the appointment of H. T. (Hugh) Harvey as operations manager of the company. In connection with this assignment, management of company field operations will be set up in a new office in Edmonton, in order that particular emphasis may be placed on the expansion of company services in Northwest Canada.

Harvey was formerly eastern division manager of Welex with headquarters in Regina, Saskatchewan, and has been with the firm since its incorporation in Canada.

S. H. (Stan) Nelner, former operations manager, has been named vice president for operations and will continue to headquarter in Calgary. Nelner came to Welex following 13 years experience in the electric wire-line department of Halliburton Oil Well Cementing Co., Ltd.

Minneapolis-Honeywell names

. . . three men to sales positions in the company's Mid-Atlantic region, announces R. L. Mallory, Industrial Products Group sales manager.

Edward J. Klein has been named regional industrial manager with headquarters in Philadelphia; John J. Horner succeeds Klein as industrial manager of the Philadelphia branch office; and Carl F. Boehnlein takes over as industrial manager of the Richmond, Va. branch office.

Klein, who joined Honeywell in 1935 and has been industrial manager of the Philadelphia branch since 1953, succeeds O. B. Pyle, who will continue as an account executive.

Horner has been with the company since 1937, first as an industrial service engineer, later as a salesman. Boehnlein joined Honeywell's Brown Instruments Division in 1945, and has been a branch sales engineer the past 9 years. At Richmond, he succeeds W. H. Reynolds.

Philip L. Jordan is appointed

. . . manager of imports of Oil Country Supply Co., where he will coordinate foreign purchasing, shipping, and importing as well as the development of barters involving a variety of products primarily associated with the petroleum industry.

Jordan previously worked for Republic Supply Co. in Illinois, Texas, and Oklahoma. He was in Venezuela with Creole Petroleum, and was materials superintendent for International Petroleum at Talara, Peru, before returning to Tulsa in 1951. For the past 8 years, Jordan has been with the foreign department of Lucey Products Corp.

Dayton Rubber Co. appoints

. . . A. L. Schriml to the post of product sales manager for the new line of Dayton Poly-V drives, announces R. G. Burson, vice president and sales manager for Dayton Industrial Products, Co., a Dayton Rubber Co. division.

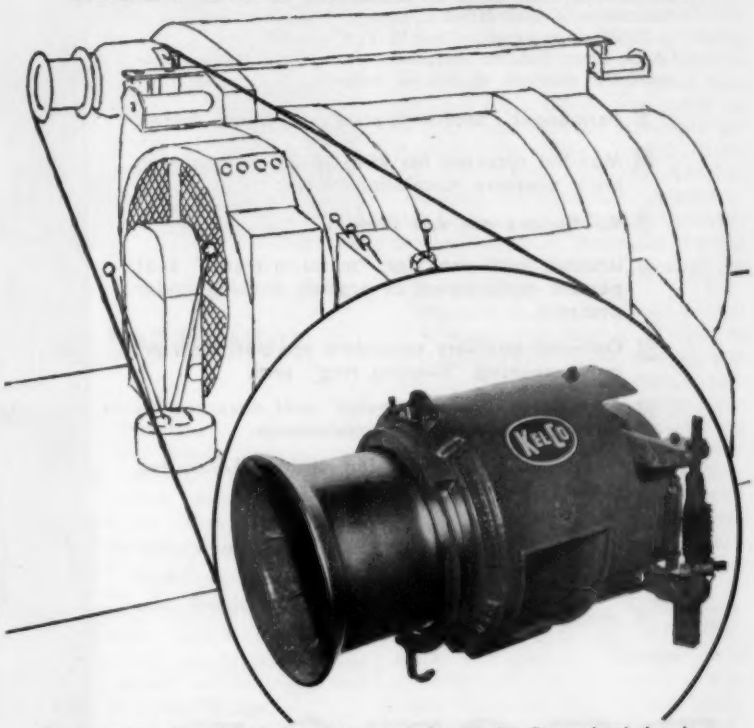
Schriml will formulate sales promotion and merchandising programs under the direction of L. J. Adams, merchandising manager. This will include conducting educational programs for field sales personnel, developing customer contacts, and functioning as liaison for the sales department.

Schriml joined Dayton in 1936. He has handled several engineering and sales assignments.

C. Ross Spencer joins W-K-M

. . . as manager of special projects for W-K-M, a division of ACF Industries, Inc. Spencer, formerly with Oil Center Tool Co. and National Supply Co., has had extensive experience in the oil-well equipment field, in both domestic and foreign operations.

FOR DEPENDABLE OPERATION
FOR SAFETY OF THEIR CREWS
KELCO IS THE CATHEAD
MOST DRILLERS CHOOSE TO USE



For almost 20 years, KelCo, the originator of the spinning line cathead, has been supplying the needs of major companies and drilling contractors. KelCo Spinning Line and Breakout Catheads are available in three sizes and 32 different models to meet the requirements of both shallow and deep drilling.

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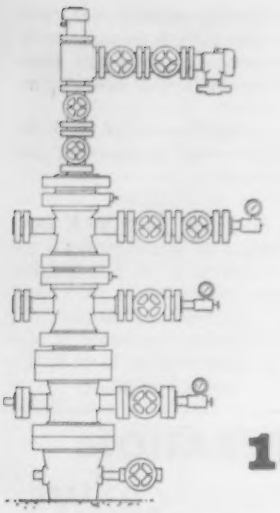

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15,000 psi

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Rector equipment meets all standards of the API and the Association of Well Head Equipment Manufacturers. Tested to 22,500 psi as stipulated in API Test Specifications.
Check these features that make Rector well head equipment the standard of the oil industry.

1. **Permanent "seal-with-steel" between strings.**
2. **Mandrel recessed for RECTOR-PSI full opening back pressure circulating valve.**
3. **All flanges are API flanges.**
4. **Ground joint seat for "metal-to-metal" seal permits replacement of organic packing under pressure.**
5. **Optional auxiliary secondary pack-off with organic packing "floating ring" seal.**
6. **Permanent "metal-to-metal" seal does not require replacement or maintenance.**
7. **"Balance slip" suspension with self-actuated sealing mechanism.**

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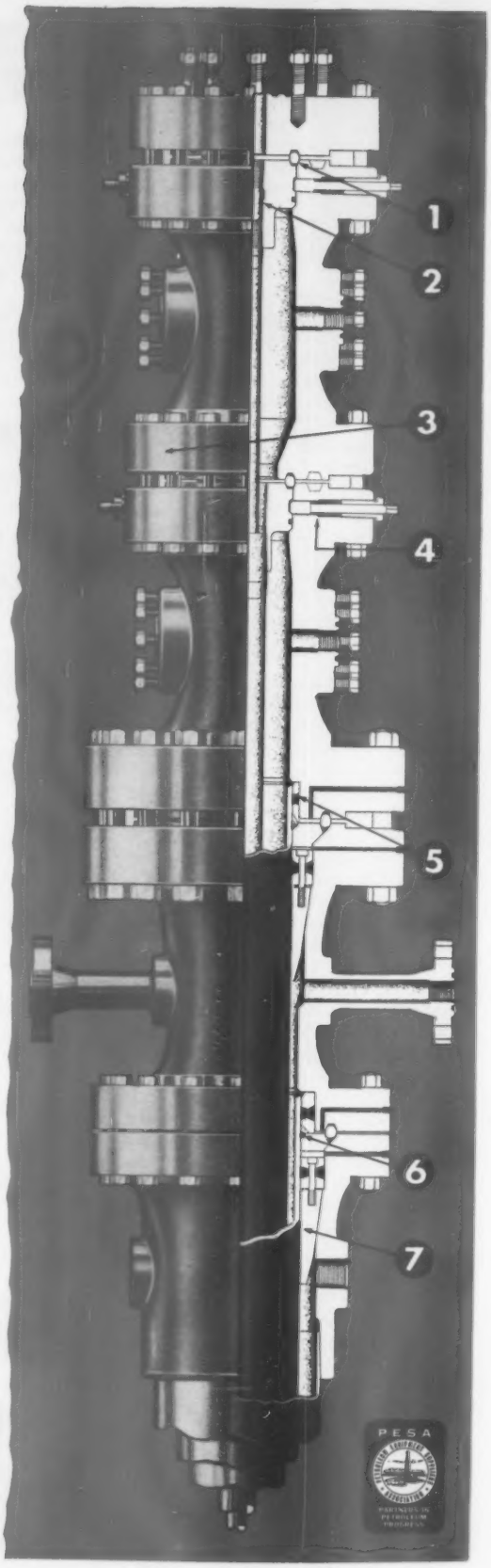
Be safe! Be sure! Buy Rector quality!
See your Rector representative or your favorite supply store.



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Using one . . .

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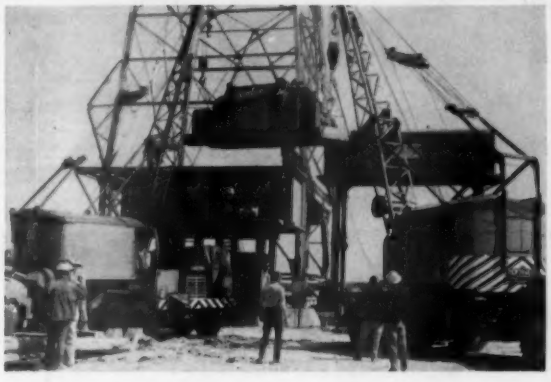

Cranes speed big-rig teardown

RIG 44 of Great Western Drilling Co., Midland, Tex., is one of the world's largest land-based drilling rigs (OGJ, Sept. 9, 1957, p. 93).

When this rig was rigged up on its first well, the Phillips Petroleum Co.'s 1-A Montgomery in Pecos County, Texas, it required less than 3 days. This would be an excellent time on rigs much smaller. But, after drilling the world's third-deepest well (23,400 ft.), Rig 44 showed even more speed in its rigdown.

The speedy rigdown was made possible by use of two truck-mounted cranes. These worked together on large pieces such as the draw works and worked separately on smaller pieces such as stairways. One crane was on the location for only 6 hours and 15 minutes; the other for only 5 hours and 30 minutes. When they left, the rig had been completely disassembled for moving.

Among the equipment handled by the cranes were the mud house, draw-works transmission with two electric motors, main draw-works skid, two pieces of transmission substructure, dog house with folding leg stand, one mud tank, three stairways with two landings, V-door ramp, drilling line, block-hook, and crown.

This is the first job on which Great Western had used the cranes. The machines were obtained through an Odessa, Tex., lease-equipment firm. Great Western men feel that such equipment could well be used to save time and money on the rigup and teardown of many big rigs.

Milestone for Beckman

Beckman, Inc., specializing in work-over projects, reached a milestone in its 23-year history in West Texas this month.

The company worked its 10,000th job on a field well in Winkler County, 10 miles south of Kermit. Beckman officials from the company's general offices in Muskogee, Okla., were on hand to witness the event. Those in attendance included F. G. Beckman, founder of the company and presently chairman of the board; Ellis Mills, president; and Jack Beshears, secretary-treasurer.

Also present were Frank Denker, superintendent of Odessa's district office; W. W. Hayden, superintendent of the Oklahoma City district office; and Carl Patterson, production superintendent of the firm in Kilgore, Tex.

Beckman, Inc., was founded in the East Texas field in 1936. Comprising the company at that time were 27 employes and 2 rigs. Today, the company has over 180 employes and 10 rotary rigs equipped with jackknife derricks. In its 23-year history, Beckman, Inc., has operated in 14 states: Texas, Oklahoma, Illinois, Indiana, Mississippi, Louisiana, Arkansas, Kansas, Nebraska, Montana, Wyoming, Colorado, Utah and New Mexico.

BOP program success

The American Association of Oilwell Drilling Contractors is continuing its seminars on blowouts and blowout preventers. Early in July plans were prepared for a 6-hour conference on blowouts and blowout preventers for Permian-basin drilling crews. Frank Whitley, chairman of the AAODC committee on education, announced that Jim Conway and John Woodruff of the Petroleum Extension Service staff would attend the meeting in order to discuss plans.

Seminars on prevention and control of blowouts were held in 32 cities in the United States, two in Canada, and one in Mexico. The currently proposed program on the Permian basin will consist of two 3-hour sessions for the drilling crews. Recent enrollment in the first group of meetings held in the Gulf Coast and Mid-Continent areas showed a total of 1,576 attending. The companies that participated numbered 167 American, 25 Canadian, and one Mexican. The top 25 companies with highest BOP enrollments were: Sinclair Oil & Gas Co.; Baker & Taylor Drilling; Kirby Oil Industries; Norton Drilling Co.; Magnolia Petroleum Co.; Wheless Drilling Co.; Amerada Petroleum Corp.; Shell Oil Co.; Nicklos Drilling Co.; Ohio Oil Co.; Pan American Petroleum Corp.; Big Chief Drilling Co.; Continental Oil Co.; Southeastern Drilling Co.; Petroleos Mexicanos; Sohio Petroleum Corp.; El Paso Natural Gas Co.; Gracey-Hellums Corp.; British-American Oil Producing Co.; Gulf Oil Corp.; W. C. Fatjo Drilling Co.; Penrod Drilling Co.; Tennessee Gas Transmission Co.; Carter Oil Co., and Lion Oil Co.

PLANNING EXPLORATION IN THESE AREAS?

On six continents,
AERO Service and its affiliate companies are now completing airborne magnetometer surveys. With Radan,® the new Doppler-radar guidance system, we are completing missions faster with pin-point accuracy . . . and saving money for our clients. Surveys are now underway in . . .

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New commitments are being made now for our crews throughout the world. If you're planning exploration in these or other areas, AERO Service will be glad to give you complete details on how you can cut mobilization costs and save valuable time.

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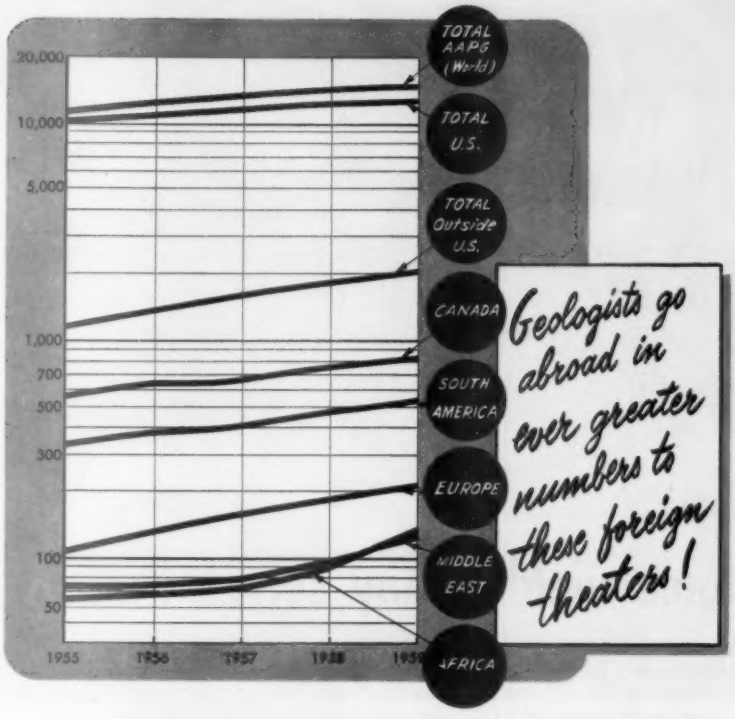


Foreign pastures look greener to many oil hunters

BY FRANK J. GARDNER

IT'S BEEN SAID that if a great change is to be made in human affairs, the minds of men will be fitted to it. Certainly this has been demonstrated many times during the past two decades. And it applies to the oil-finding business as surely as to any other. For one of the greatest changes in human affairs of recent years has been the complete shift in oil's center of gravity from west to east.

And the minds of men are being fitted to this change. Tomorrow's oil finder is likely to be as well-versed in the geology of Surinam as he is in the geology of Texas or Oklahoma. Even now, he watches the progress of a wildcat in Angola as avidly as he does one in Arkansas. It's all part of the broadening perspective of explorationists today.

Geologists and geophysicists are well aware of the trend. For more and more of them are going abroad to look for oil. The American Association of Petroleum Geologists' annual "Geographic Distribution of Members" table clearly reflects the change. Similar figures for the Society of Exploration Geophysicists are not available, but if they were, the foreign move would be even more apparent.

This emphasis on the world-wide look is affecting and will affect every phase of exploration, from the classroom to the board room. In some geology and engineering schools, the undergraduate is bumping into heavier requirements in languages, history, and sociology. This will grow. Companies interviewing graduates are going to look for linguist, geologist, geographer and diplomat, all wrapped up in one neat package.

Personality, family background, and attitude toward people will become ever more important. One prominent geologist puts it this way: "As we train our future expatriate exploration people, we must know more and more about them and their families before we send them abroad . . . What profit in finding too late that the man has a supercilious and contemptuous attitude to his foreign environment, or that his wife is unhappy if she can't get home to mother every three months?"

As he enters the profession, the graduate geologist will find that he's only begun to learn. His employer will expect him to be well versed in basic fundamentals of his science—not much more. Our colleges probably will never turn out world oil experts; the detailed knowledge of foreign geology will have to be learned on the job. But he'll be expected to apply his basic learning in almost any spot on earth, from Arctic to Antarctic.

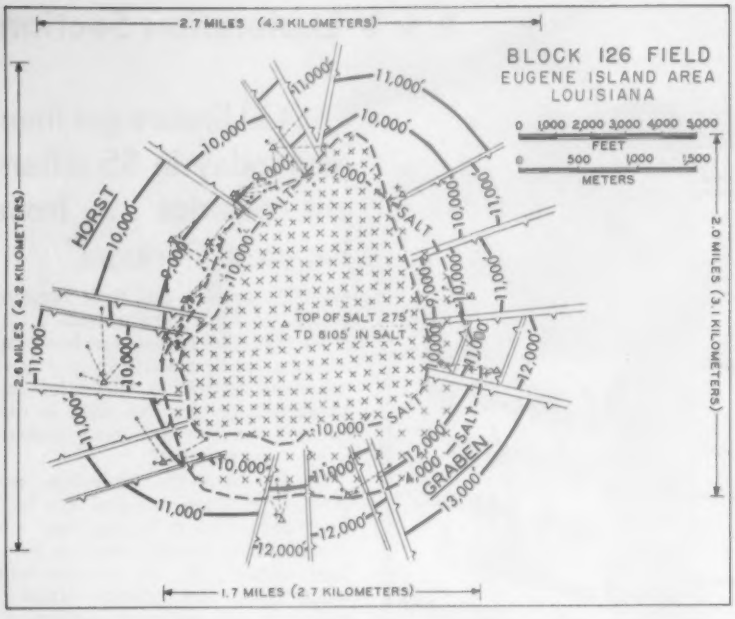
Those in the exploration business today are finding it necessary to bone up on basic principles as well as on foreign lands. The thinking they've applied to West Texas may not apply to Mozambique. And in a science as flexible and changing as geology, just keeping up to date is becoming a full-time job. All of this makes for a new awareness and a broadened interest in the doings overseas. This was clearly evident at the recent World Petroleum Congress, where 20% of the papers were devoted to exploration and development; in all, geologists and geophysicists from 22 countries delivered 57 top-notch papers in their fields.

A look at the chart above reveals some interesting things. The mounting interest in Africa, for instance, has led to a rapid growth of AAPG membership there. The European curve climbs steadily upward, too; France, for instance, now lists 69 residents, compared to 29 in 1955. Over-all, there's been a decline in U. S. residents from 89% in 1955 to 86% today.

Oil finders now receive their mail in 85 different countries, from Papua to Portugal. Outside the U. S. and Canada, the greatest number live in Venezuela, where 322 are busily searching for oil.

We'll probably not find oil in all those lands, but the 2,000 men who are looking for it are convinced that the chances are good.

"... Oil finders get their mail today in 85 different countries . . . from Papua to Portugal"



STRUCTURE MAP is contoured on top of No. 2 sand. Dotted lines represent top and base of salt overhang. The sand mapped is just below Pliocene-Miocene contact. Fig. 1.

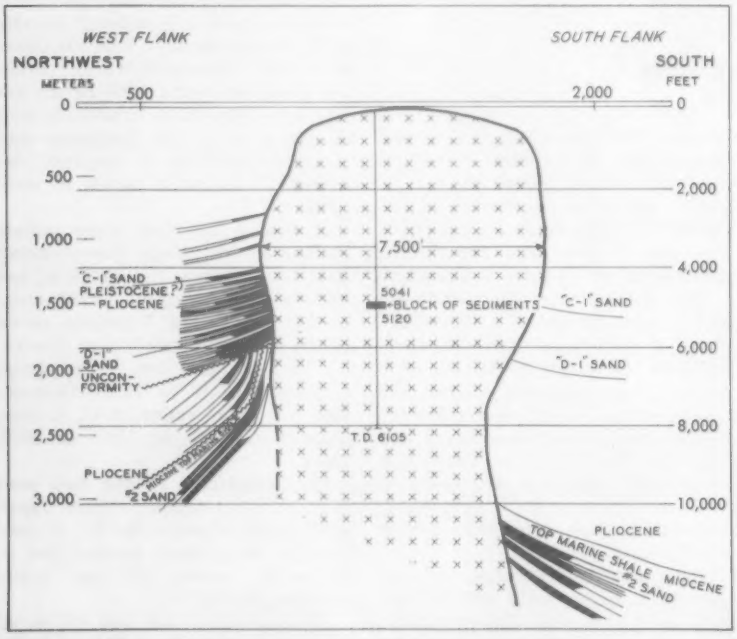
BY GORDON I. ATWATER
Consulting Geologist
New Orleans

Highly complex dome yields many secrets

THE RESULTS of early exploration in the Block 126 field, Eugene Island area, Louisiana, encouraged many of the offshore operators during their initial plunge into the coastal waters of Louisiana. The field is located approximately 25 miles offshore in average water depths of 50 ft., although the structure has a local surface expression, with water depths of about 18 ft. over the top of the reef. The salt may be said to reach the surface of the sea floor, as during construction one of the anchor beams of a platform penetrated salt.

This is an excerpt from a paper presented at the Fifth World Petroleum Congress.

The structure as mapped both on top of the salt and on a reservoir sand just below the Pliocene-Miocene contact, Fig. 1, is typical of the smaller piercement salt domes of Louisiana, unusual only in that overhang of the salt stock is present throughout almost the entire periphery. The practically circular salt stock measures approximately 2 miles in diameter at a depth of 4,000 ft. The sediments terminate against the salt stock under the overhang on all flanks of the dome except in the extreme northern portion of the structure.



CROSS-SECTION of the salt dome is from the west to south flanks. Note the peculiar block of Oligocene sediments penetrated by the velocity well drilled in the middle of the salt plug. Fig. 2.

Fault pattern . . . A pattern of faulting is developed in the surrounding sediments that is termed "folding-fan radial," as the faults in the northern hemisphere of the structure dip in a clockwise direction, while in the opposing hemisphere their dip is counterclockwise. As a result, a horst block on the northwest diametrically opposes a graben block on the southeast.

As seen in cross-section, Fig. 2, uppermost Miocene beds in the horstal area are brought up to within 6,000 ft. of the surface before truncation by a major unconformity, while on the south flank the same horizon terminates against the salt 4,000 ft. lower. Approximately 4,000 ft. of beds present on the south flank of the

Libyan Sands Yield Forgotten Arsenal

. . . to GSI crews in their search for oil

Before they can probe the subsurface for geophysical data, GSI field parties in Libya must probe the desert sands for dangerous remnants of World War II.

German Teller mines, British, French, and Italian bombs, artillery shells and other relics of desert fighting are turned up by GSI mine clearance parties in advance of geophysical exploration.

Uncovering and disarming anti-tank and personnel mines isn't usually considered part of a geophysicist's job, but, to get the data its client needs, GSI has taken mine clearance in its stride. GSI counts among its demolition experts former members of the British Eighth Army and Rommel's Afrika Corps... now working side by side to reap what they had sown nearly twenty years ago.

In all fields of exploration GSI has the experts and the facilities to get the job done the way it must be done.

GEOPHYSICAL SERVICE INC.

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structure between the Pliocene "D-1" sand and the Miocene "No. 2" sand have been removed by erosion represented by at least two unconformities on the northwest flank.

Pay zones . . . Commercial accumulation of oil is found in a series of 33 productive sands between approximate depths of 3,000 and 12,800 ft., and ranging in age from Pleistocene to uppermost Miocene. The major reserves of the field, well in excess of 125 million barrels, are found in a series of Pliocene sands between depths of 4,500 and 6,500 ft. on the northwest flank, above the unconformities shown on the cross-section. While production has been established on other flanks of the dome, the reserves attributable to these quadrants of the structure are relatively minor. This selective occurrence of major reserves in a single flank characterizes many of the South Louisiana piercement salt domes. One of the wells located on the northwest flank of the field had a total net effective oil-sand thickness of almost 1,300 ft.

In the more structurally normal south flank area, the Pleistocene-Pliocene contact is at a depth of approximately 5,000 ft., and the Pliocene-Miocene contact occurs at depths of about 11,000 ft. The deepest well drilled on the structure to date reached a depth of 12,879 ft., and was still in the uppermost portion of the Miocene at total depth. Thus most of the Miocene section still remains to be explored around the periphery of this dome, and there is no reason to believe that the major portion of this virgin section will not contain sands suitable as potential reservoirs.

Velocity well in salt . . . It is interesting to note that a well drilled for seismic purposes in the center of the salt stock, Fig. 2, penetrated an isolated block of sediments at a depth of about 5,000 ft. The Hackberry zone microfauna contained within this xenolithic block of sediments indicates it as Oligocene in age, normally more than 10,000 ft. deeper, stratigraphically, in the section than the lowest horizon penetrated on the structure to date.

The pattern of development of the field by directional holes drilled from a relatively few number of permanent platforms located around the periphery of the salt is shown in Fig. 1. Well bottoms are placed so as to penetrate the individual reservoirs at their optimum structural positions under the overhang. A total of 64 well bores, drilled from 13 platforms, has resulted in 53 producing wells, most of which are dually completed.

Wyoming is Rockies' pacemaker

EXPLORATION in the Rocky Mountain States was healthy during the first half with Wyoming leading the way. Total drilling in that state exceeded that of all the others with new exploratory interest at its highest pitch.

About 100 rigs are busy in Wyoming this summer with a varied assortment of targets awaiting them. The Green River basin enjoyed a brisk first half of gas exploration as was forecast earlier. Because of the large number of units formed in this basin last year and so far this year, activity here is expected to continue its climb, barring unforeseen events.

The Powder River basin figured highly in exploration and will continue to gain momentum for the remainder of the year. Mesaverde rocks are the objective here. This search is helped along by the successful Dakota and Pennsylvanian hunt on the east side of Powder River. Important strikes in Powder River include Rozet, Timber Creek, Brown Ranch, and an extension to Lonetree Creek field. Rozet is in Campbell County as is Timber Creek. Lonetree Creek is in Weston County as is Brown Ranch Newcastle field.

Tertiary rocks are coming into their own in the Wind River basin as a result of good oil finds in the Wind River sand. The Wind River is a widespread sand and will see much more action soon. Recent gas discoveries in Natrona County in the middle of Wyoming pushed this county up front at the beginning of July, making it the state's most active arena.

The time-worn Big Horn basin, most prolific of Wyoming oil bowls, is back on the interest list. There has been little activity here for several years of any significance. Two new indicated strikes point up the remaining potential of this old producer.

Northern Rockies

The most significant single development story in this region was and is in Montana's Stensvad field. About 15 producers make this the highlight of Central Montana activity. This Rosebud County field, a Tyler sand producer, is expected to grow even more in the coming months.

Montana didn't fare too well in total completions during the first half. Total drilling is below previous years, but there are good signs of a pickup soon. New interest is stirring in the Disturbed belt with the announcement of new wildcats in this northwestern Montana area where only one commercial producer has ever been tapped.

In the Williston basin area of Montana, particularly in the Richey area, new development wells have made as much as 1,000 bbl. daily, waking up one of the oldest areas in the basin. The long Cedar Creek anticline has been all too quiet for the past 3 years while events in North Dakota stole the show.

This is North Dakota's best year yet. Biggest play remains in Burke, Renville, and Bottineau counties, well off the Nesson anticline. There may be a playdown of activity during the last half, but the year promises to end every bit as good as 1958.

South Dakota is busy this year with new extensions and producers in the sole producing area, Harding County's Buffalo area. This year's drilling has warmed cold interest in the state which hasn't seen much action since the discovery of oil several years ago at Buffalo. A brisk leasing spree is noted in several areas with bonus bids coming higher.

The Denver Basin

This Rocky Mountain success standby continued strong during the first half with discoveries popping up all over western Nebraska and northeastern Colorado. Nebraska still leads the race which it began about 3 years ago over Colorado. Focal points of activity and success are Kimball, Cheyenne, and Banner counties.

Nebraska's new interest center, however, appears to be in the Hitchcock County area in the far southwest just across the Kansas line. This new Pennsylvanian province is at the peak of its development interest with the big success by Skelly Oil Co. at Reiher field being the fire. Both states, Kansas and Nebraska, racked up important new Pennsylvanian oil finds during the first half, making this province the most interesting in the Mid-Continent region. This interest shows no signs of slackening. The entire northwest corner of Kansas is busily searching for Pennsylvanian oil. Counties figuring in the play are Rawlins, Sherman, and Cheyenne in Kansas, while Nebraska's Hitchcock County leads there.

Other eastern Colorado centers of drilling interest are in the southern part of the Denver basin, up to the Las Animas arch, and over into the Anadarko basin. Several tests were put down in the Raton basin.

Paradox Basin

Colorado is stealing the show in this basin with big Pennsylvanian strikes recorded earlier in the year at Flodine Park and Towaoc. Both wells had big potentials, but followup wells were disappointing. However, in mid-July, an offset to Flodine Park appeared to be commercial.

The Utah portion of the basin only had two small discoveries, but both were northwest of current production. There are several wildcats planned to Mississippian and Cambrian in the outer reaches of the basin this summer. Other Utah interest lies in the San Rafael Swell area and in the Kaiparowits basin.

Four Corners

Northwest New Mexico is still the busiest area in the southern Rockies. A big program is moving along in Horseshoe Canyon and Verde fields in the San Juan basin. Dakota wildcatting is continuing to climb as predicted. Several good discoveries were made during the first half.

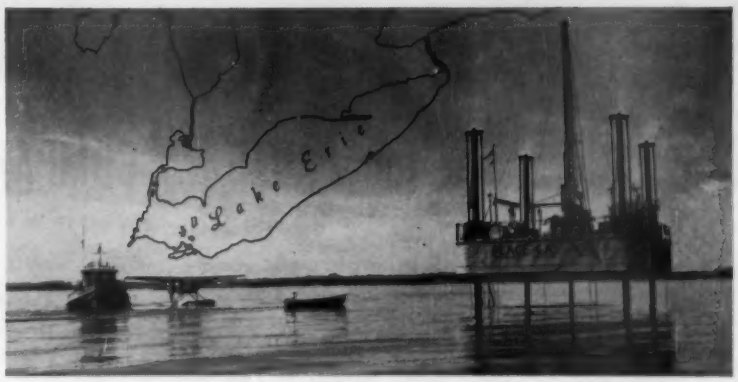
Six rigs to work Lake Erie waters

WITH five wells now drilling, Place Gas & Oil Co. will expand to a six-rig operation on its various acreage blocks in the offshore gas-oil development areas of eastern and western Lake Erie.

In the eastern sector the company has two wells currently drilling on its 80-sq.-mile acreage spread in the Selkirk area where drilling successes to date have indicated the presence of an important gas field. Place 5 Walpole, ¾ mile offshore and ½ mile east of the Place 1 Walpole discovery well is better than halfway towards its objective Red Medina pay formation at expected depth of approximately 850 ft. Place 8 Walpole, drilling from the "Mr. Cliff" floating platform is located ½ mile east of the No. 7 success and about 1 mile south of 5 Walpole.

In the Port Dover area, Place 6 Dover is drilling on an offset location to the Place 5 Dover, rated at better than 1.25 M.M.c.f.d., following recent treatment.

In the western sector of the Lake, Place 1 Colchester has obtained a substantial oil pay with strong bottomhole pressure in a horizon heretofore not known to be productive in Ontario. This flow of high-gravity oil was obtained below the Guelph but in a much higher formation than the producing Trenton formation of the Imperial-Harvest-Submarine discovery, located on shore ¾ of a mile to the east.



THE ONTARIO SIDE of Lake Erie is buzzing with gas exploration.

To fully assay the production potentials of the well and the area the well is now being carefully checked and tested. Place 2 Colchester, located ½ mile east of 1 Colchester is drilling. At Kingsville, Ontario platform is being erected for the Place 2 Gosfield well, with drilling expected to be under way by midweek.

Delivery of the two floating-type platforms of the Mr. Cliff design is expected shortly and will greatly boost the tempo of the company's drilling operation on the lake.

The company's technical staff of engineers and geologists have operational bases located at Selkirk, Port Dover, and Harrow, Ont., with complete two-way radio communications with all rigs.

These Wyoming areas made oil news:

Hams Fork, Goat Hills...

Wyoming's Green River basin got two new units to drill on last week. The U. S. Geological Survey announced that Hams Fork Unit in Lincoln and Uinta County in the southwestern part of the state and the Goat Hills Unit in Sublette County have been approved.

Continental Oil Co. operates Hams Fork on 17, 18, 19 and 20n-115-116w —a 73,063-acre area. The unit is divided into three separate blocks. Commitments call for 9,000 ft. Frontier wildcats within 6 months of the completion on both the B and C blocks. Work is under way at 23-1 Unit in NW NE 23-20n-116w on Block A. This Weber Pennsylvanian test will go to 6,000 ft.

Those with working interests here include Husky Oil Co., Terminal Oil Co., Arrowhead Exploration Co., Mountain Fuel Supply, Carter Oil Co., Brinkerhoff Drilling Co., Hiawatha Oil & Gas Co., Benedum-Trees, Penn-Ohio, Pan American Petroleum Corp., and Union Pacific Railroad Co. Location of the block is 6 miles southeast of Kemmerer, Wyo.

Belco Petroleum Co. has the Goat Hill Unit in 30, 31n-113-114w, Sublette County. It has 20,710 acres to the north and northwest of Deer Hill field. Agreement calls for a Mesaverde Cretaceous test to 5,530 ft. within 6 months of the effective date. Working interests here include Belfer, Carter, Pan American, Schermerhorn Oil Co., Kenwood Oil Co., Gulf Oil Corp., and Big Piney Oil & Gas Co.

...and Figure Four units

Wyoming's Green River basin got one of its best gas strikes yet last week. Carter Oil Co. reported an estimated 18 M.M.c.f.d. from second Frontier Cretaceous sand at its 1 Figure Four Unit in SW NE SW 15-27n-112w, Sublette County.

Perforations in the second Frontier were at 7,626 to 7,784 ft. This is the first try on the 3,320-acre unit which lies northeast of East LaBarge and Birch Creek fields.

NOW... a superior charge for Maximum Well Flow

The ATLAS-JET – exclusive with PGAC

Here are the FACTS . . . COMPARE for yourself!

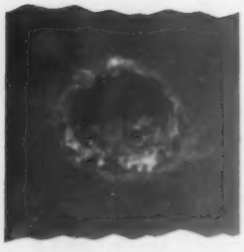
PGAC's new 4" ATLAS-JET charges were recently test-fired in a standard flow lab under simulated subsurface conditions of 1500 p.s.i. at 180°F., into targets with ⅜" steel face-plates, ¾" Hydromite, and 15" deep Berea Sandstone (not cement!) confined in 4½" drill pipe, at stand-offs of 0" – ½" – 1" and 2" in fluid. Well Flow Index for all tests: 1.5 min. to 1.7 max.

The unretouched photos below show a representative test with ½" s.o., the results of which far surpass the published data for all competitive guns. ATLAS-JET data . . .

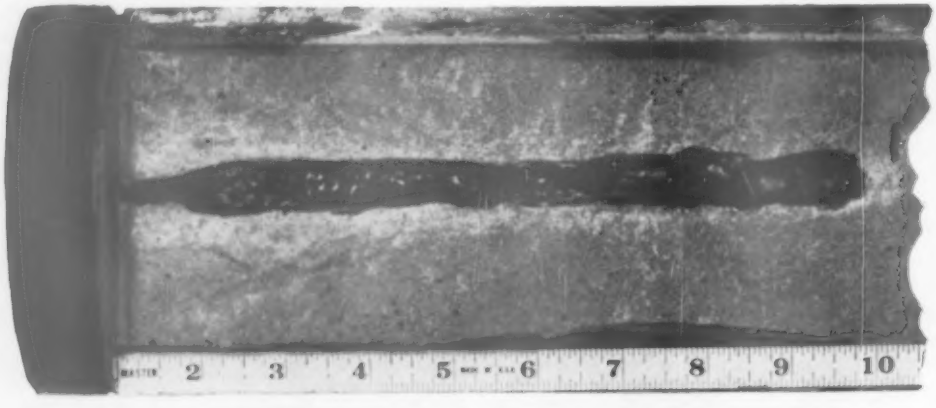
WELL FLOW INDEX	1.6
CLEAN HOLE DEPTH	10"
HOLE DIAMETER	0.60"

These tests were conducted independently of PGAC, with all targets and lab flow data complying with the proposed API standards for perforator evaluation.

Upon request, PGAC field engineers will gladly show you the complete test data – proof of the superiority of the new ATLAS-JET charges now available for 4" and 5" o.d. jet guns.



Actual-size photo of entrance hole through face-plate of test at right



Test result with ½" s.o. in fluid: W.F.I. 1.6; Probe Depth 10"; Hole Diam. 0.60"

PGAC-597

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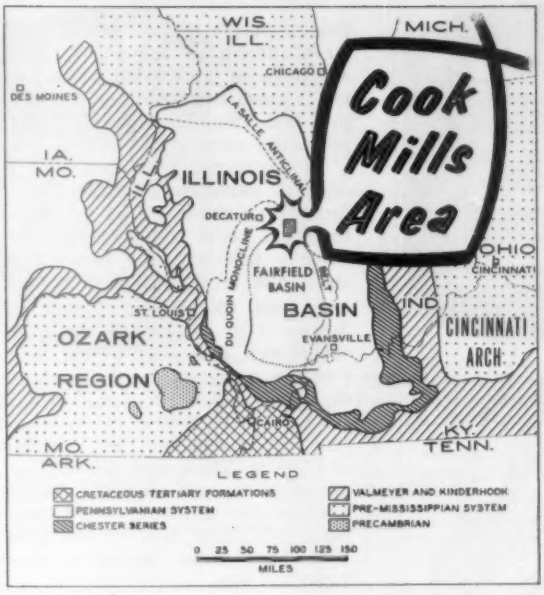
Illinois interest centers on basin's north rim



BIG SUCCESS in Cooks Mills area keeps Illinois oil hopes high. Fig. 1.

DEVELOPMENT of significant oil production from erratic sand lenses in the Ste. Genevieve Mississippian carbonate sequence about 20 miles north of other production in East Central Illinois has generated new interest in the oil possibilities along the northern rim of the deep part of the Illinois basin.

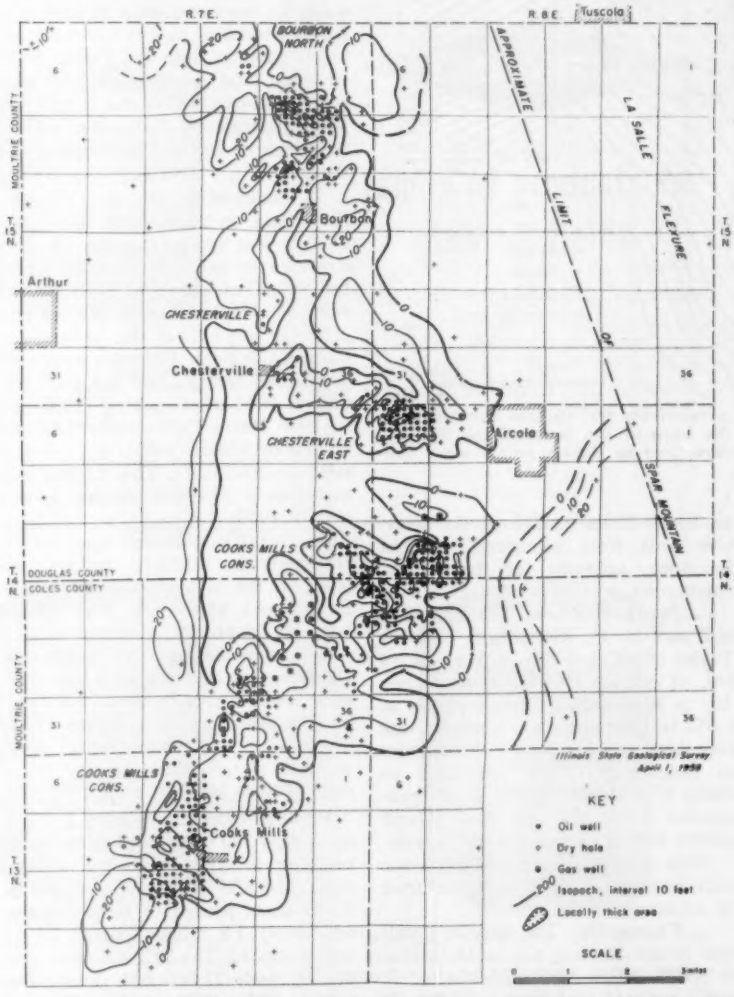
Focal point of this new interest is the Cooks Mills area of northern Coles and southern Douglas counties. It is a rectangular area of about 200 sq. miles. The first producer was completed in 1941, but the big development here didn't begin until 1954. By the end of 1957 more than 600 holes had been drilled with 334 of them producing in five different pools. More than 3,000,000 bbl. of oil had been produced from 5,170 acres. Reserves studies indicate that 7.5 million to 8 million more barrels of oil will ultimately be produced from these wells.

Pay zone . . . The pay sand commonly referred to as Rosiclare is older than true Rosiclare and is correlative with the Spar Mountain sandstone.

The Ste. Genevieve formation is divided into three members—the Levias at the top, the Spar Mountain (or Rosiclare), and the Fredonia. The name Spar Mountain sand is used here for the middle member recognized in the Ste. Genevieve and commonly called Rosiclare in the Cooks Mills area and most other parts of the basin.

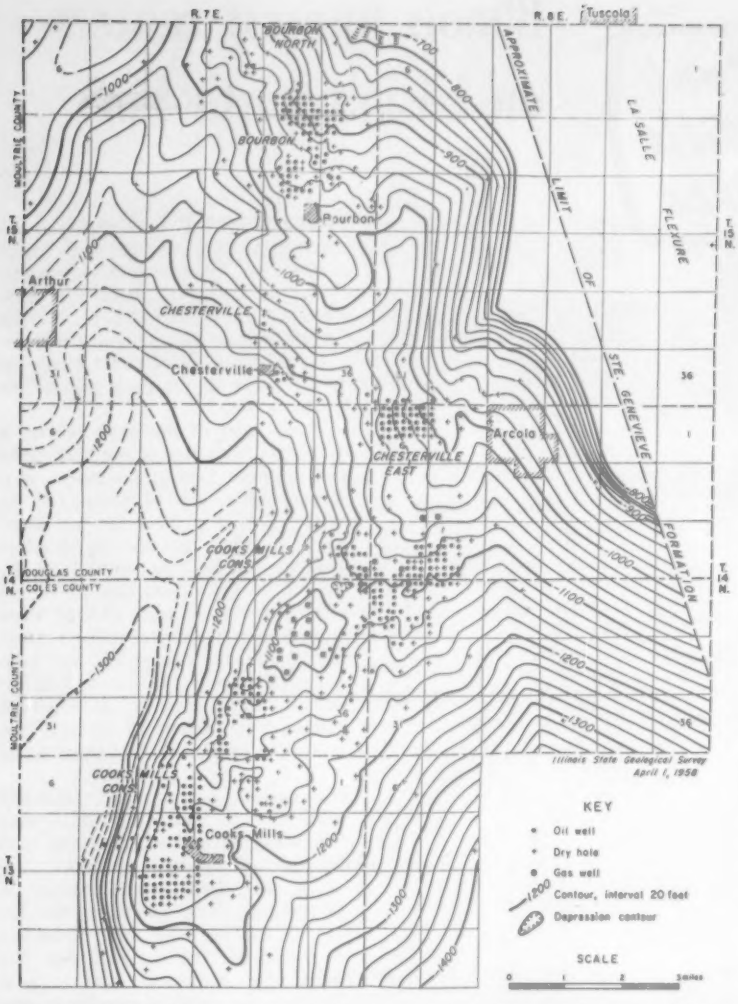
Structure . . . Structurally, the Cooks Mills area (Fig. 1) lies north of the center of the Illinois basin. It is on the northeast edge of the deeper or Fairfield basin portion of the Illinois basin, and just west of the LaSalle anticlinal belt which is the major positive feature within Illinois basin.

Producing history . . . In May 1954 Clyde Bassett completed 1 Haybrook in 2-13n-7e, Coles County, for an initial production of 24 bbl. per day from the Spar Mountain (Rosiclare). This well revived interest in the old Cooks Mills area where production had been abandoned in 1950. Nearly all of the 334 oil and 17 gas wells in



SPAR MOUNTAIN SANDSTONE in the Cooks Mills area of Illinois invites interesting speculation, as revealed by this isopach map. Fig. 2.

An abridged version of "Spar Mountain Sandstone in Cooks Mills Area, Coles and Douglas Counties, Illinois," by Lester L. Whiting. Circular 267, Illinois State Geological Survey, Urbana, 1959.



THE SPAR MOUNTAIN was deposited on a relatively flat surface very close to sea level. Structure contour maps using the base of the Beech Creek (Barlow) limestone and the top of the Ste. Genevieve lime as datum points show continuous dips to the southwest. Fig. 3.

the area produce from the Spar Mountain of Middle Mississippian Valmeyer age. Gas comes from the Cypress Chester Mississippian.

...Bourbon pool. The discovery well was C. B. Earnst 1 H. Pflum, SW¼ SW¼ SE¼ 11-15n-7e, Douglas County. It was completed in April 1956 for 155 bbl. of oil daily. Top of Spar Mountain pay was 1,654 ft. At the end of 1957 there were 45 dry holes, 64 producers. Proven acreage covered 680 acres. Production had amounted to 763,000 bbl. This represents more than a third of the total oil expected from the pool by present methods.

Production is located on a nosing feature that extends south-southwest off the LaSalle structure. Contours based on the Ste. Genevieve indicate a flattening in dip over the nose at the pool. This terracing, together with an updip facies change of the reservoir beds from sandstone to fight limestone, accounts for the oil accumulation.

...North Bourbon. The discovery well was M. H. Richardson 1 W. C. Taylor in NE¼ 3-15n-7e. It made 58 bbl. of oil and 42 bbl. of water per day in May 1956. Top of pay is at 1,651 ft. Only one more producer was completed, an east offset. Production to January 1, 1958, amounted to about 15,000 bbl. of oil. Daily production is 12 bbl. per well. About 20,000 bbl. of recoverable oil remain.

Wells are on the regional dip slope with no indication of updip reversal or terracing.

...Chesterville. The discovery well was Arnett Drilling Co. 1 M. Miller in NW¼ NE¼ SW¼ 35-15n-7e. It was completed in August 1956 for 70 bbl. per day from 1,806 ft. There were five producers at the end of 1957. Production to January 1, 1958, amounted to 20,500 bbl. There remains about twice this amount to be produced. There are about 100 proven productive acres.

The scattered wells are on the regional southwest dip slope where there is no indication of closure or terracing. Local sand conditions apparently determine the presence or absence of oil at any given location.

...East Chesterville. Pierce and Zuhone 2 S. L. Munson is the discovery well. It flowed 787 bbl. daily, arousing operators in the basin to this area's real worth. Location is in NW¼ NE¼ NW¼ 6-14n-8e. It was completed in July 1957. Pay was at 1,723 ft. There were 40 wells producing at the end of 1957. Production was more than 464,000 bbl. covering a productive area of 400 acres. Total pool output should be about 2,000,000 bbl.

Accumulation here is controlled toward the northeast by a flattening in dip over a nosing feature which farther south develops into the Cooks Mills structure, and a change in the sand which becomes tighter and calcareous. The nonpermeable carbonates prevent migration of oil northward along the strike.

...Cooks Mills. This field's history dates back to 1939 when small production was tapped on the Mattoon structure in 1-11n-7e, Coles County. In 1941, Carter Oil Co. got a 30 bbl. well at 1 Haybrook in 2-13n-7e. This officially opened the present-day Cooks Mills field. Only one more well was added though, and the pool was quit in 1947 after making 6,000 bbl. In 1946 North Cooks Mills field was opened by Vincent Nolan at 1 Coombs estate in 23-14n-7e. This 12-bbl. well made only 219 bbl. before it was quit in 1950.

In 1956 Clyde Bassett completed 1 Haybrook in 2-13n-7e, reviving interest in the area with a small well. East Cooks Mills field was opened later for 54 bbl. per day and another well was added near the Haybrook. Development slowly spread out from these wells. The area was consolidated into Cooks Mills Consolidated pool. Some wells were small, others made as much as 1,000 bbl. per day. Average is 100 to 200 bbl. daily.

Between 1953 and January 1, 1958, more than 390 holes were drilled here, resulting in 222 producers, 17 gas wells, and 155 dry holes. An area of 2,950 acres proved to be productive and about 1.8 million barrels of oil was produced. The 212 wells still producing made 28,000 bbl. during December 1957. It is estimated that 4.5 million barrels remain in the field.

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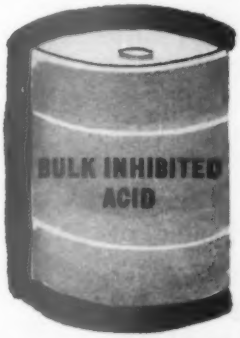

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California's offshore era still ahead

ONLY ONE of California's 50 known offshore structures has been fully evaluated with the drill. Exploration off the coast, principally reflection seismograph supplemented by submarine core drilling, has mapped more than 50 known structures in the submerged sedimentary basins within 10 miles of shore. The author declares that when the developments of the 26 years since the first application of directional drilling to the offshore are considered, together with expected technological developments, it can only be concluded that California's offshore era is yet to begin.

BY FRANCIS J. HARTIG
Executive Officer,
State Lands Commission,
State of California.

CALIFORNIA'S offshore exploration and development started in 1896 at Summerland, downcoast from Santa Barbara. This offshore work, possibly the first in the world, reached a peak in 1906. At that time 412 wells had been drilled along the beach, or from piers, with the most waterward well about 750 ft. from shore.

... **Jurisdiction.** The first statute under which California asserted jurisdiction over offshore minerals was not adopted until 1921.

... **Early drilling.** Drilling permits and leases issued under this statute resulted in further and deeper development offshore at Summerland; at Rincon in Ventura County (onshore section of a 1927 field); and at Elwood in Santa Barbara County (onshore section of a 1931 field). All wells in this program were drilled from piers with one exception. At Rincon the first piling-supported offshore drilling platform was built in 1932. Three wells were drilled on it.

In 1932 the first well was drilled directionally from a surface location at Huntington Beach in Orange County, to a bottom location offshore. This opened Huntington Beach Tideland pool. Since then more than 635 wells have been drilled directionally from onshore locations into offshore waters —at Huntington Beach, Belmont (Seal Beach), Montalvo, Coal Oil Point.

In 1954 a man-made island was built at Seal Beach in Orange County to serve as the base for directionally drilled wells. Another island was built in 1958 at Rincon as well as off Summerland.

In addition to the offshore operations conducted in California waters under state laws, three offshore fields have been developed and are producing under leases and authorization from the cities of Redondo Beach and Long Beach (Wilmington field) in Los Angeles County, and from the City of Newport Beach in Orange County. These lands were granted the mentioned cities by the state.

This is an abridgement of a paper presented at the Fifth World Petroleum Congress, 1959.

Techniques

The 1896 Summerland field produced from unconsolidated sands at about 600 ft. Field location was chosen because of oil sands outcropping on the coastal bluffs.

... **Drilling after 1927** was from substantial piers as long as 3,015 ft. in water up to 39 ft. deep. This era opened extensions to onshore discoveries in Ventura and Santa Barbara counties. Many lessons were learned from these operations—lessons that paved the way for protection of marine structures in salt water. Production was piped to terminals on the beach.

... **First piling.** The first piling-supported offshore platform was at Rincon in 1932. It was 2,500 ft. offshore in water 34 ft. deep. This location was picked as an extension try to an onshore field. Production was gathered in tanks on the platform and moved later by barge to shore.

... **Controlled directional drilling.** This has advanced from its first application in 1932 at Huntington Beach to a highly developed use of precision tools and instrumentation. Directional drilling in this area has employed drilling equipment to the maximum of their capabilities. One well went to 14,850 ft., total depth, and a well with horizontal separation of 10,828 ft. between a surface location at sea level and the corresponding well bottom at a vertical depth of only 3,993 ft. below sea level.

It should be noted that wells drilled directionally under oil and gas leases from the state are drilled through space coordinates assigned for the location of the well at the time the well is designed. These techniques have permitted development of the offshore area on a desired spacing pattern for one field of 1 well to 5 acres, with the

California's offshore score this year:

12 oil wells completed

7 strat tests drilled from platforms and floating barges to depths between 4,500 and 8,200 ft.

3 rigs currently drilling from islands and platforms . . . Standard-Humble at Summerland, Richfield at Rincon, Monterey-Texaco at Seal Beach.

3 strat tests drilling from barges and mobile platform off Santa Barbara County on parcels leased by Phillips et al., Texaco-Monterey, Standard-Humble.

Standard-Humble will start a second rig soon at Summerland platform.

Contracts for building two new platforms for Santa Barbara parcels expected soon.

Little new drilling planned until next year.

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New Welex Jet Perforator

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The Welex Sidewinder for the *first time makes* perforating *economical* and *effective* in slim-hole wells where small diameter pipe or tubing has been set for casing.

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The new Sidewinder principle, which places the primacord on the side of the charge, permits an additional one-fourth inch added to the effective length of the charge—a full 5½ grams of explosive. The Sidewinder delivers maximum penetration, *at least 50 percent more* than any similar gun in the industry, with *minimum debris.*

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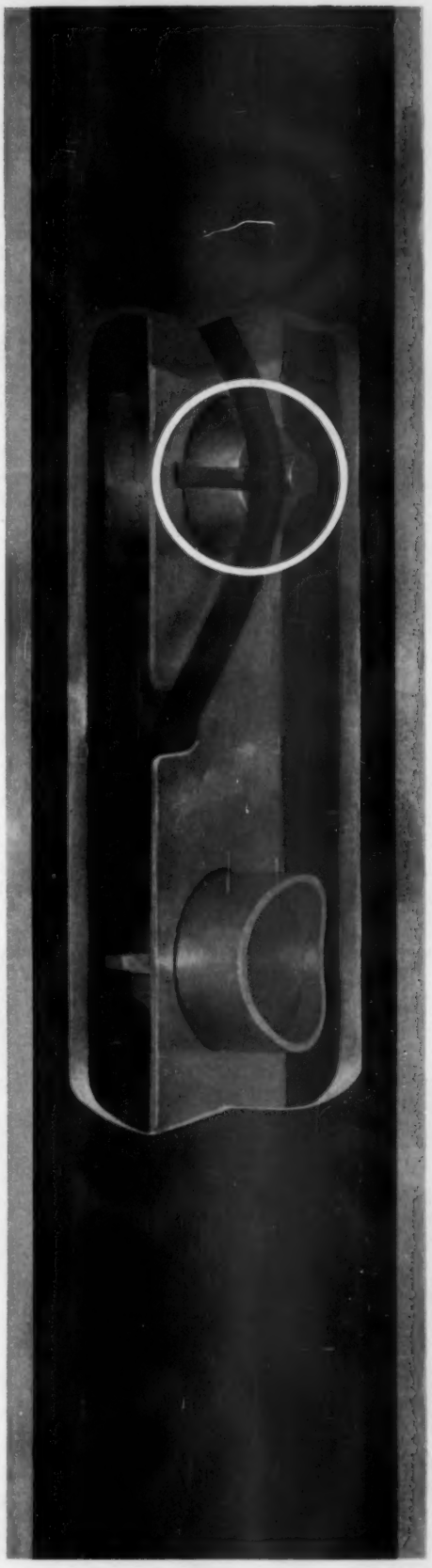
2. No debris is left in the hole after firing.
3. Gun is retrievable through 2¼" seating nipple before and after firing.
4. Risk of casing damage is reduced to minimum because hollow carrier absorbs the majority of the detonation shock.

For maximum penetration in slim-hole perforating, choose the revolutionary new WELEX SIDEWINDER. For more information call your nearest Welex representative.



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Trademark of Jet Research Center, Inc.

STATEMENT OF CONDITION

June 10, 1959

RESOURCES		
Cash and Due from Banks	$51,154,865.83	
U. S. Government Securities	71,364,933.07	
Other Bonds and Warrants	13,991,509.15	$136,511,308.05
Loans and Discounts		87,518,914.82
Income Receivable Accrued		574,779.26
Stock in Federal Reserve Bank		397,500.00
Bank Premises		4,000,000.00
Customers' Liability Under Letters of Credit		289,110.54
Total		$229,291,612.67

LIABILITIES		
Deposits		$204,279,946.75
Letters of Credit Outstanding		289,110.54
Income Collected, Not Earned		452,821.75
Reserve for Taxes, Interest, Etc.		1,723,092.44
*Dividends Declared, Not Yet Payable		137,500.00
Bills Payable		2,500,000.00
Capital—Common	$5,500,000.00	
Surplus	7,750,000.00	
Undivided Profits & Reserves	6,659,141.19	19,909,141.19
Total		$229,291,612.67

*Payable June 15, 1959

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surface locations of wells spaced as close as 2 ft., where onshore locations for such operations have been at a premium.

... **Seal Beach Island.** This drilling island, built in 1954, was placed 8,100 ft. offshore in 42 ft. of water to permit development of a structure found by a discovery well on the shore. This directionally drilled well has a total drilled length of 12,131 ft. and a maximum inclination from vertical of 81°.

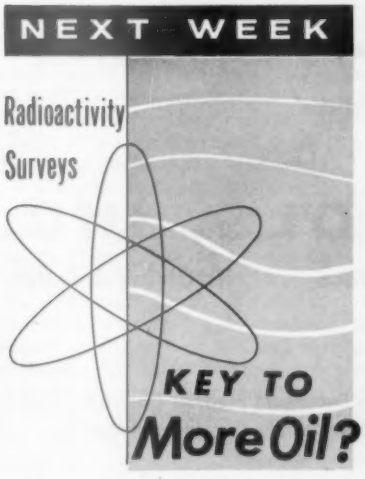
Predrilling notes . . . All current exploratory drilling is based on selection from the results of submarine seismic surveys, submarine core drilling, and geologic mapping of the ocean floor correlated with the regional geology that is known on shore.

... **total seismic crew-months** in offshore waters is 200. This has been estimated to be the equal of 150 crew-years of work on land.

... **more than 1,000,000 ft.** of core holes have been drilled from mobile platforms, and from underwater core-drilling barges.

... **mapping of the ocean floor** off Southern California has been carried on by geologists trained to dive down to 185 ft. The numerous seeps offshore have been mapped by these divers. This technique has made possible the extension rather than the projection of coastal surface geology, ocean-floor map correlation with seismic surveys, and structural interpolation between underwater core-hole locations.

... **Rincon island** was located on the basis of data from onshore, seismic surveys, and marine core holes. The platform's production will be moved to shore by pipeline. Maximum use will be made of remotely controlled, automatic production equipment on the platform.



Geology and Hydrography

Six major sedimentary basins lie along and off the California coast. The southernmost, Santa Maria, Ventura, and Los Angeles, lie about 50% offshore. These are the top three of the four major oil provinces in the state. All current offshore oil output comes from the Ventura and Los Angeles basins. Some believe four billion barrels of potential production by current methods for primary recovery lie in the offshore portions of these two basins.

... **Pays.** Offshore pay zones developed to date go no deeper than the Sespe Oligocene (Fig. 1), and this in only three fields. Miocene is the big pay in the Santa Maria basin . . . Ventura basin has Pliocene, Miocene, and Oligocene pays . . . Los Angeles Basin has Pliocene and Miocene production.

... **Faults.** Offshore fields have the same complex geologic problems as their sister fields onshore. There is extreme faulting—thrust faults with measured vertical displacements of 5,000 ft. have been penetrated, and faults with displacements of over 10,000 ft. are known to extend into the offshore - variable permeability of zones, extremes in lenticularity and unusually heavy overburden covered by deep water. Heavy overburden and extreme water depth have resulted in difficult seismic reflection exploration and the discovery of areas which are currently impossible of effective survey by seismic methods. The deepest water being explored now is at Summerland at 100 ft. Some areas being surveyed have depth of water up to 378 ft. These deep areas will get the directional drilling method.

... **Offshore lands.** The total area of offshore lands within the state's limits is about 8,500,000 acres. Depths increase rapidly offshore in California as contrasted with the Gulf Coast and Atlantic Coast (Fig. 2). Weather isn't the factor here that it is on the Gulf Coast, but occasional hurricanes do sweep between the coast and the offshore islands or Continental Borderland.

... **Some unique factors** to southern California offshore drilling are drillsite requirements for absolute safety and production control because of the nearness of recreational and housing facilities—this doesn't figure into Gulf Coast drilling as much.

Production

Total offshore production from 1921 to June 1958 in California has been 561,746,019 bbl. from about 8,040 acres of developed lands (see table).

TABLE 1—CALIFORNIA OFFSHORE PETROLEUM PRODUCTION
(Barrels)

	State leased lands*	State granted lands**
1950***	202,064,722	105,779,051
1951	16,376,037	23,312,498
1952	15,419,078	21,678,518
1953	14,754,776	19,599,928
1954	15,154,003	17,502,645
1955	15,983,487	17,245,707
1956	16,061,974	15,899,239
1957	16,233,351	14,128,964
1958****	7,662,102	6,889,939
	319,709,530	242,036,489

*Capitan, Elwood, Coal Oil Point, Summerland, Rincon, Montalvo, Belmont Offshore, Huntington Beach fields. **Redondo Beach, Long Beach (Wilmington), Newport Beach fields (municipally administered). ***Cumulative total from 1921, or initial production in respective fields, through 1950. ****Through June 30.

What's ahead . . . About 1,250,000 acres of offshore lands with water depths of less than 300 ft. await the explorer. With only the Sespe tested, a large stratigraphic section lies in wait offshore. Pressure maintenance and secondary recovery will help those fields already discovered.

Complete exploration and development of California's offshore lands needs the entire range of engineering techniques for exploration, drilling, and production. The exploration men face a real challenge in California's offshore waters. Present day equipment is good—but we need much better. Many problems already met will be bypassed in the future. By the same token the future holds many problems unknown to Gulf of Mexico geologists. Much will be learned. More work is needed.

EVER WONDER ??

GEOQUESTION . . .

Which is correct? pre-Cambrian or Precambrian?

GEOANSWER . . .

All rocks formed before Cambrian time are now called Precambrian. This spelling is seen in many forms . . . Pre-Cambrian, preCambrian, and in its correct form, Precambrian. The accepted form does not, however, pave the way for such spellings as Prepermian or preordovician. Rocks formed before Permian time are called pre-Permian.

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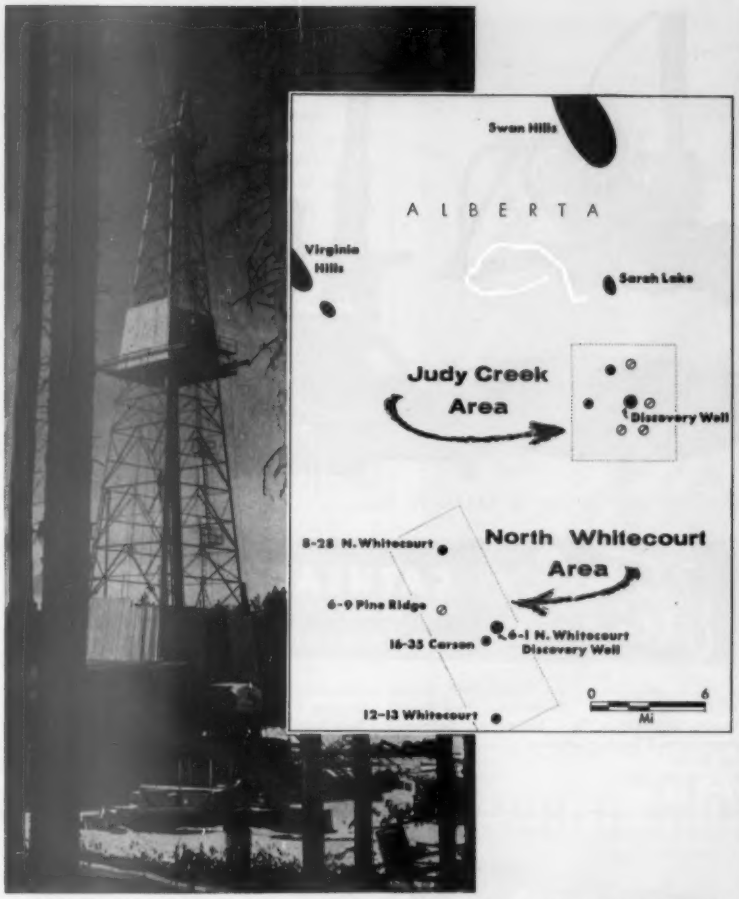

EXPLORATORY INTEREST in the general Judy Creek-Swan Hills-North Whitecourt area is at a feverish pitch, stirred by tremendous drilling success, the current large-scope development program, and the coming lease sale in Alberta. (Photo courtesy Imperial Oil, Ltd.).

Swan Hills interest shifts south

DEVELOPMENT activity in Alberta's North Whitecourt area is brisk this summer. Mobil Oil of Canada, Ltd., reports three oil finds southwest of Judy Creek and is ready to complete another, is drilling a fifth well, and has quit at still another.

The drilling program of Mobil's at North Whitecourt is being carried out on lands originally contained in petroleum and natural-gas reservation No. 1973. The company bought this spread of 92,160 acres as provincial Parcel No. 20 at a 1953 sale. Cash bonus of $197,222.40, an average of $2.14 per acre, was paid out.

The 6-1-62-12 North Whitecourt discovery, a Beaverhill Lake Middle Devonian producer, was followed up at a ⅞-mile southwest diagonal offset. Mobil is preparing to finish this one. A new try is the 6-9-62-12 Pine Ridge, 3¼ miles northwest of the discovery well.

A nearby followup well, 16-35 Carson, Mobil took several drill-stem tests in the Beaverhill Lake. Completion was at 8,898 ft.

Interest flares . . . The whole industry will be watching the Judy Creek-North Whitecourt-Swan Hills region this summer. This Middle Devonian giant has built up into one of western Canada's biggest oil reserves in the past few months. Development drilling is at high gear this summer with more planned when winter comes.

The coming Alberta land sale is also a factor in the heated interest in this area. Imperial Oil, Ltd.'s, recent Judy Creek discovery and subsequent offset strikes plus Mobil's activity at North Whitecourt, and Home Oil Co. et al.'s continued expansion in the Swan Hills field area make Alberta one of the hottest exploratory areas on the scene today.

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for PIPE
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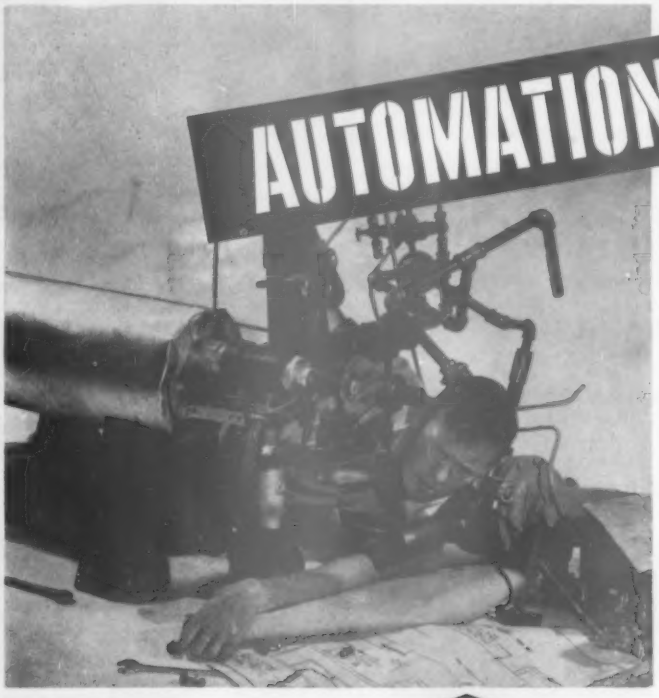

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Anadarko basin registers top wildcat success

NORTHWESTERN Oklahoma and adjoining Anadarko basin states led the nation in successful wildcatting during the first half with some of the most important discoveries in many years put on the board.

The five-state area of Texas, Oklahoma, Kansas, Colorado, and New Mexico all had wildcatting. Only one didn't hit pay—Northeast New Mexico. The most important discoveries were in northwestern Oklahoma counties and in the three-tier-county area of the Oklahoma Panhandle.

... **Custer.** This western Oklahoma county got its first production at what is being hailed as the most important strike in the Anadarko basin in several years. Magnolia Petroleum Co. 1 Miller found prolific gas-condensate production in deep Hunton Siluro-Devonian rocks below 14,000 ft. This discovery heralds a new drilling era for the basin.

... **Roger Mills.** At the middle of July this county was promised its first production at Magnolia 1 Young. Testing continues at the wildcat which will go on down below the Deese Pennsylvanian where good shows were encountered. If successful, first production would be opened in the county, and the last oil-barren county in the entire basin would fall by the wayside.

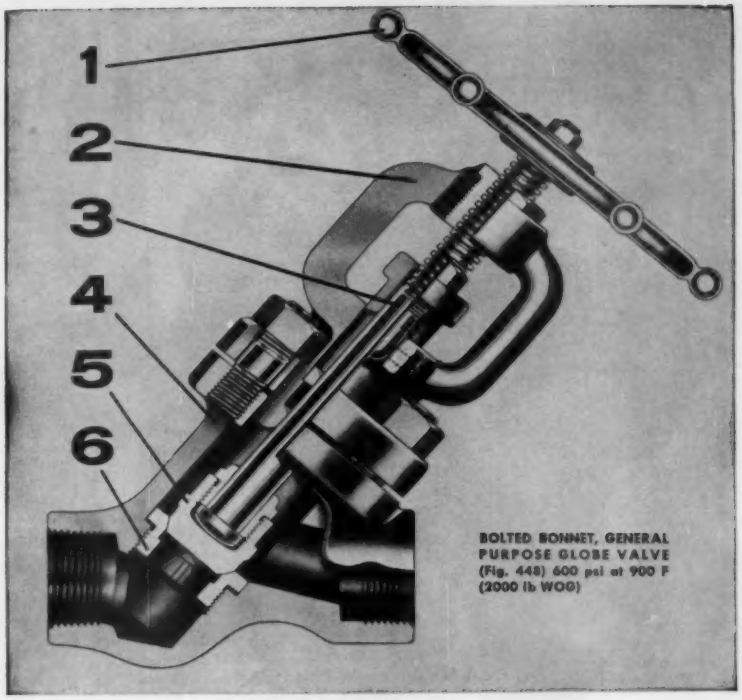
... **Harper County.** This county's success ratio was high during the first half with highly successful development work reported in North Buffalo field, a multipay giant near the town of Buffalo just south of the Kansas line. This field was last year's big strike and appears to be this year's big development story for northwestern Oklahoma.

Other Harper events included link-up strikes in the Laverne-Highland district.

... **Panhandle.** This area had the highest success ratio of all Mid-Continent areas. Indeed, the success ratio here is among the highest in the country. Beaver County alone rose above 80% success ratio with new Pennsylvanian oil, condensate, and gas fields opening up all over the county. This play continues strong.

... **Texas County.** The inside Hugoton pre-Permian push, not new to the area, hit a new fast stride during the first half. Several new pools were opened inside the vast gas area, particularly on the northeast side and northwest side of the county.

... **Cimarron.** This far-western county in the Panhandle is busier this year than it has been since the days



BOLTED BONNET, GENERAL PURPOSE GLOBE VALVE (Fig. 448) 600 psi at 900 F (2000 lb WOG)

You need less maintenance with...

Edward Globe Valves for petroleum services

For hundreds of petroleum services from oil field to refinery, Edward globe valves give longer, trouble-free service at less cost. Here are some reasons why:

1 Handwheel of malleable iron is properly proportioned and knobbed for easy gripping

2 Forged steel yoke withstands rugged service

3 Stem is wear resistant EValloy 13% chromium stainless steel

4 Body of forged steel is streamlined for minimum pressure loss

5 Disk of 13% chromium stainless steel or chromium-cobalt-tungsten alloy steel is also available with Stellite hard surface

6 Replaceable seat is made of wear-resistant EValloy 13% chromium stainless steel or hard-surface Stellite. Integral Stellite seat also available

UNION BONNET, INSIDE SCREW GLOBE VALVE (Fig. 2698) 600 psi at 900 F (2000 lb WOG)

MANY FEATURES AVAILABLE— With Edward globe valves you have a wide selection of features.

- inside screw or O.S. & Y. construction
- screwed ends or socket welding ends
- bolted bonnet (shown above) or union bonnet (below)
- backseat stem or disk-nut shoulder for repacking under line pressure
- ratings to 2500 psi at 1050 F, 10,000 lb WOG
- sizes from ¼" to 2"

Edward builds a complete line of cast and forged steel stop, check, and stop-check valves for all pressures and temperatures.

For additional information, see your favorite distributor, or write for Globe Valve Bulletins 551 & 14G to Edward Valves, Inc., 1212 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company.

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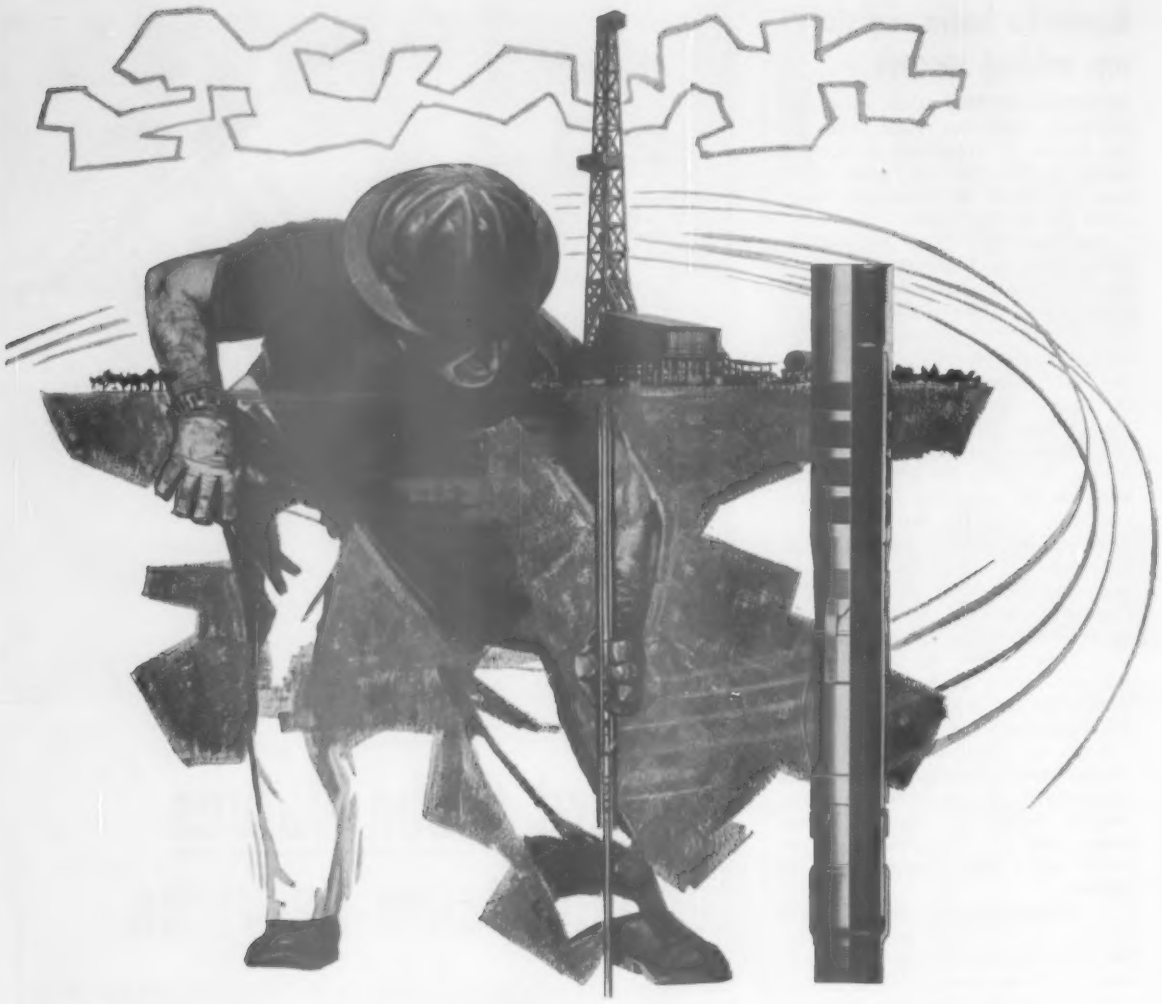

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BAASH-ROSS JOY

of Keyes gas field's development. Focal point for action is the southeast corner in the Griggs area. A multi-pay gas and oil reservoir is shaping up on the northeastern flanks of the Dalhart basin.

... **Texas Panhandle.** Both wet and dry wildcatting made news in Texas. The northern tier of counties, especially Ochiltree and Lipscomb, added a healthy array of new fields with gas, oil, and condensate production from the prolific Pennsylvanian sands. Interest points were mainly near the Oklahoma line, just south of the fast-moving southern Beaver County play.

... **Palo Duro.** No discoveries were made here, but this northwestern Texas basin got the largest amount of wildcatting for the period of time in its history. Nearly every county in the basin got action, but the main drilling spots were along the northern flanks of the Matador arch. The play spilled over into eastern New Mexico's San Miguel County, and into the southern part of the Dalhart basin. The discovery well of oil in the Palo Duro basin was reentered for a new-pay discovery at Alamosa Ranch in Oldham County. Several new wildcats are spotted in this Texas area so we can expect some more news during the last half. The Palo Duro is one of the least drilled provinces in the country, so it may take some time for someone to hit. But a success here would stir interest to a new high both in the Texas and Oklahoma portions of the basin.

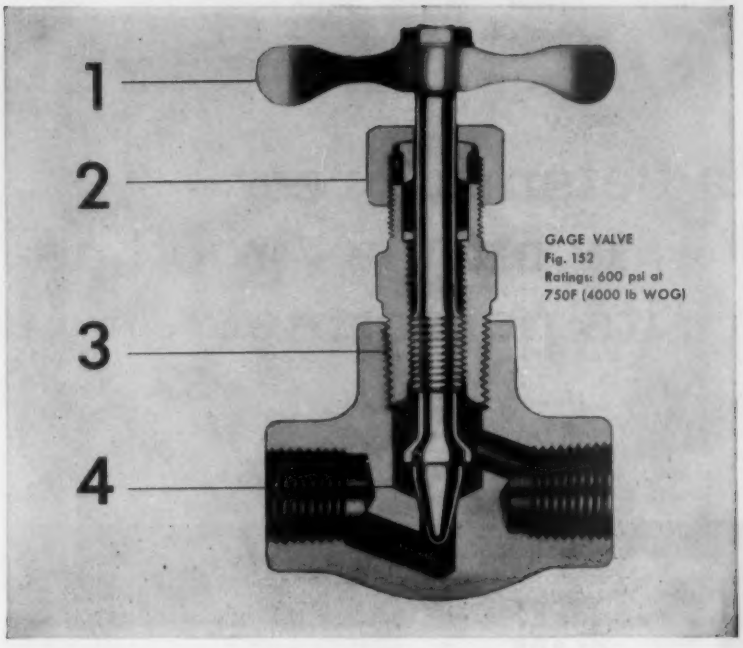
... **Southwest Kansas.** The Pleasant Prairie area inside Hugoton field in southwestern Kansas was extended and combined with other Mississippian fields, making it the biggest inside-Hugoton producing area in Kansas.

Other regional activity in Kansas included new Permian production outside Hugoton field in Grant County, several Pennsylvanian gas finds in Meade and Seward counties, and scattered exploration throughout the area.

... **Southeast Colorado.** This area, just southeast of the Las Animas arch, gained extension wells to existing gas fields, and a couple of new Pennsylvanian gas strikes. McClave field in Kiowa County was extended, while new gas production was opened in Baca County.

The Outlook

Looking ahead regionally, in the Anadarko basin expect more wildcatting in the remote and production-less areas. Considerable wildcatting is expected in the Palo Duro basin, southeastern Colorado, southwestern Kansas, and in the Oklahoma and Texas panhandles. If the Roger Mills



GAGE VALVE
Fig. 152
Ratings: 600 psi at 750F (4000 lb WOG)

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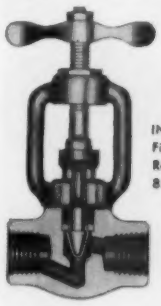
STRONGER VALVE BODIES: Edward *gage valves* are made of drop forged steel for sounder structure and greater strength than valve bodies machined from bar stock. Available in carbon steel, 13% chromium stainless steel or 18-8 stainless steel.

Edward instrument valves have a carbon or 13% chromium stainless steel body. Carbon steel body has an integral cobalt-chromium-tungsten alloy steel seat that resists pitting and gives maximum resistance to corrosion and erosion. You have a choice of screwed or socket welding ends.


INSTRUMENT VALVE
Fig. 952
Ratings: 2500 psi at 850F (6000 lb WOG)

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2. **On gage valves, the bonnet and packing nut are EValized (exclusive Edward plating process) to minimize galling and corrosion. Instrument valves have EValized gland and gland bolt nuts, stainless steel gland bolts.**
3. **Taper-threaded joint between bonnet and body of gage valves prevents bonnet from backing out of valve. Instrument valves are of bonnetless design.**
4. **Semi-needle, integral stem-disk is made of EValley 13% chromium or 18-8 alloy stainless steel, hardened for wear resistance on both gage and instrument valves.**

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County wildcat is a success, a deep-drilling spree should erupt in western Oklahoma. The Oklahoma Panhandle will continue its lead over other Anadarko basin contenders with Beaver County way out front. The southern portion of this county will catch most of the drill's attack.

Penn find in Hitchcock

NEBRASKA'S side of the big push to Pennsylvanian in the Las Animas-Cambridge arch province got a healthy addition at Skelly Oil Co.'s 1 Frakes in Hitchcock County.

Skelly swabbed oil at the hourly rate of 42 bbl. from Lansing-Kansas City Pennsylvanian perforations at 3,880-84 ft. This new field-opener is 1½ miles north of Burr Oak field.

Ohio's Layland extended

In Ohio successful completion of an eastward stepout of Layland pool in south-central Clark Township, Coshocton County was announced by the operators, Preston Oil Co.

The producer, 1 Earl Fox, Section 18, logged the Clinton sand at 3,404-59 ft. and gaged 120 bbl. oil and 657 M.c.f. after fracture.

NE Montana due test

The first exploratory work of the year for northeastern Montana's portion of the Williston basin is slated by Carter Oil Co.

A remote wildcat more than 13 miles from nearest oil is the 1 Soo-Tribal in C NE SE 8-32n-52e, Roosevelt County. It will go to 10,700 ft. or the Winnipeg. Location is 14 miles east of East Bredette field.

Panhandle strike is hinted

In Texas, Apache Production Corp. reports a good gas show at its 1-A Luthie, a wildcat in NW NW Section 401, Block 43, H&TC Survey, Ochiltree County.

The well encountered a stray lower Morrow formation and on drill-stem test from 9,278-9,340 ft. 1,325 M.c.f. of gas surfaced in 2 minutes. The gas return climbed to 4,500 M.c.f.d. in 20 minutes. The flow was through a 1-in. choke. The tool was open 1 hour and the recovery included 255 ft. of gas and distillate-cut mud and 370 ft. of muddy water.

The surface flow pressure was 160 lb., the initial bottom-hole flow pressure was 550 lb., and the shut-in pressure ranged from 4,110 to 3,910 lb.

The well is in the Dickinson-Luthie area and is 2½ miles from Apache's 1 Hartman, the nearest gas production. Crew is drilling ahead at 9,364, aiming at the Mississippian at about 9,500 ft.

New pay in North Texas

A new Strawn pay has been reported for the Leftwick field area of northwestern Wise County.

Petroleum, Inc., Dallas, 1 Artherhold flowed 970 M.c.f.d. with a gas-liquid ratio of 49,500:1. Production is from the Strawn at 4,506-08, 4,518-20, and 4,524-37 ft. Fracture treatment was with 15,000 gal. of acid and 17,000 lb. of sand. Total depth was 5,800 ft., with 4½-in. casing set to 4,610 ft.

The well is in the T. Leftwick Survey, A-500, 2 miles south of Chico. Operators have requested new-field designation as Artherhold (Strawn).

Three tests revive old Gulf Coast field

The old Edna gas field northwest of Edna, in Jackson County, Texas Gulf Coast, is being revived with the starting of three tests by Carrl Oil Co. and Tennessee Gas Transmission Co., operating jointly.

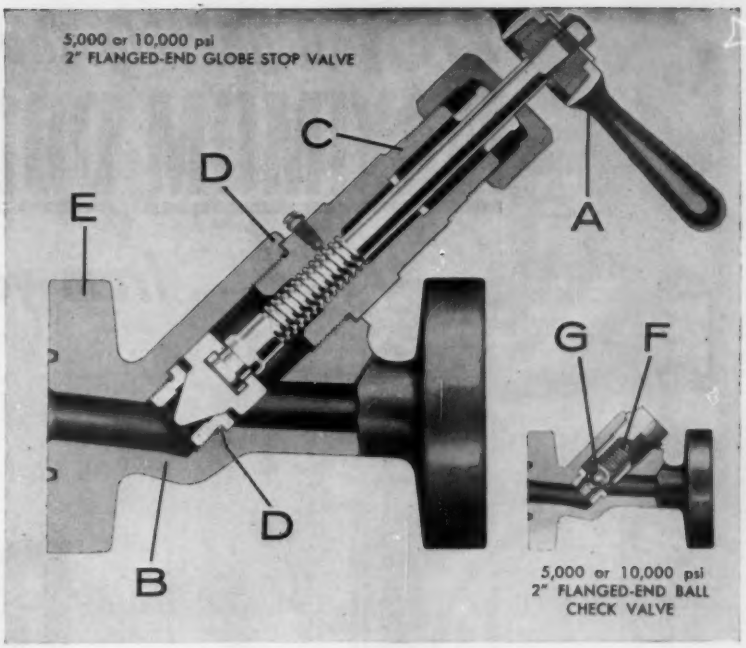
Two of the new tests, 1-A and 1-C Drushel, are projected to 7,500 ft. The other, No. 1-B, has permit for 6,000 ft. These depths are below the known productive horizons.

Gas production from shallow sands, discovered in 1921, has been abandoned since 1954. Previously proved pays have been in Oakville, Heterostegina, Frio, and Vicksburg sands from 2,200 to 5,350 ft. Shows have been obtained in lower Vicksburg and Yegua sands to 7,150 ft.

Gulf Coast field expands

A gas well rated good for 225 M.c.f.d. has been completed in the East Mustang Creek field, east of Ganado, in eastern Jackson County, near the Wharton County line. It is the third well for the field. All have made large gas flows.

The well, Texkan Oil Co. 1 R. C. Burns Unit-1, is productive from Frio sand at 5,936-40 ft. Test flows ranged from 869 M.c.f.d. through ⅛-in. choke to 3,587 M.c.f.d. through ¼-in. choke. Gas yielded 56°-gravity condensate in the ratio of 138 M.c.f. per bbl. of liquid.



New Edward High-pressure Valves for Petroleum Services

New high-pressure, *flanged-end* valves from Edward are designed to give you longer, more dependable service for many petroleum industry applications requiring highest quality in forged steel valves: high pressure heaters, treaters and separators, high-pressure vessel blow-down; headers and flow lines; bypass lines; unloading in compressor stations; blow-out preventer manifolds; throttling services; and many other similar petroleum industry applications.

NEW GLOBE STOP VALVES—There are two new Edward flanged-end, globe stop valves: one for pressures to 5,000 lb WOG at 300F (10,000 psi test); and one for pressure to 10,000 lb WOG at 300F (15,000 psi test). Both valves have the exclusive cross-arm style Impactor handle* (A) that makes closing against high pressure much easier, eliminates need for "cheaters." Valve body (B) is drop forged of chromium-molybdenum alloy steel to exacting requirements for maximum ruggedness and long life under toughest service conditions. The inclined bonnet (C) facilitates streamlining of flow passages, reduces pressure drop and wear-producing turbulence. Metal gaskets (D) and buna-N "O" rings assure tight, leak-proof fit between body and bonnet and between seat and body. Flanges (E) are forged integral with body and faced according to A.P.I. Standard 6B.

New globe stop valve Figs. 5158 and 9158

New ball check valve Figs. 5160 and 9160

NEW BALL CHECK VALVES—In the same pressure classes as the new stop valves, are two new forged-steel, ball check valves. These new check valves have the same general construction plus stainless steel spring (F) and 16% chromium stainless steel ball disk (G) for tight seating. Seat and ball disk are replaceable.

To get the complete story, plus ratings and dimensions, on new Edward flanged-end valves, write for Bulletin 584. Edward builds a complete line of cast and forged steel valves for pressures to 10,000 lbs, with flanged, screwed, socket, or butt welding ends. For additional information, see your favorite distributor, or write Edward Valves, Inc., 1212 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company. *T.M. Reg. U.S. Pat. Off.

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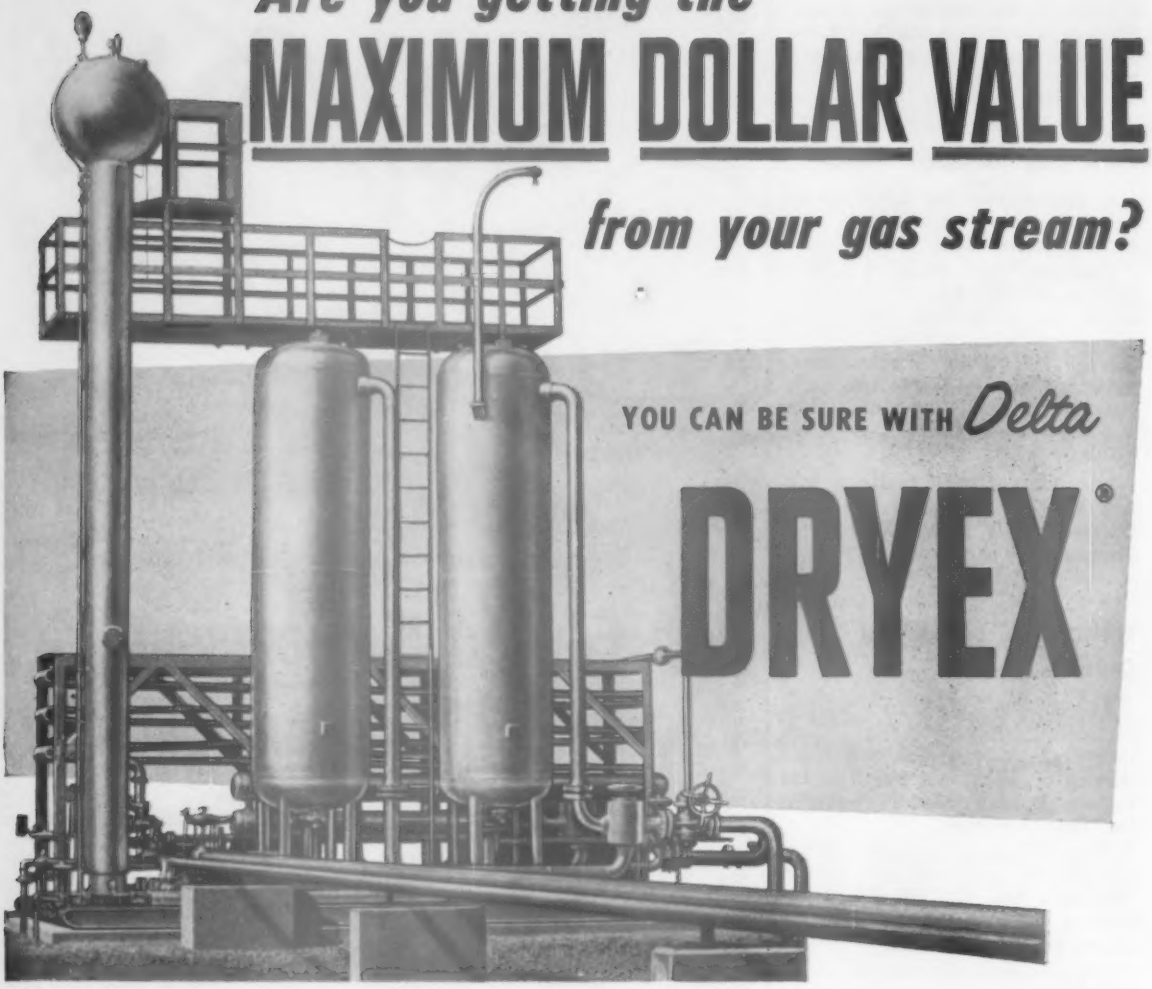

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THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Western Oklahoma's Ellis adds more gas reserves

In Oklahoma, a Pan American Petroleum Corp. wildcat well in the Anadarko basin recovered gas from two zones on production tests.

Pan American 1 Phillips, located in 15-24n-24w, Ellis County, Oklahoma, recovered gas at the rate of 2,740 M.c.f.d. and a trace of oil from the Tonkawa, topped at 5,825 ft. Recovery was from perforations 5,835-39 ft. On an earlier production test, gas recovery from the Morrow at the rate of 1,300 M.c.f.d. was recorded. The Morrow recovery was through perforations 7,653-57 ft., with top of pay at 7,630. Operator is continuing tests.

The well is located 3 miles north of the Pan American 1 Herndon, which was completed in the Morrow late last year and flowed gas at the rate of 1,744 M.c.f.d. The Morrow on the 1 Herndon was topped at 7,980 ft.

Pan American is operator of the Phillips Unit No. 1 and owns 50% interest in the well and in 640 acres on which the well is located. Pan Am also holds full interest in an additional 1,300 acres in the area. Other owners of the 1 Phillips include Texoma Production Co. 37.5%, and Shell Oil Co. 12.5%.

Oklahoma's Laverne gets Morrow oil production

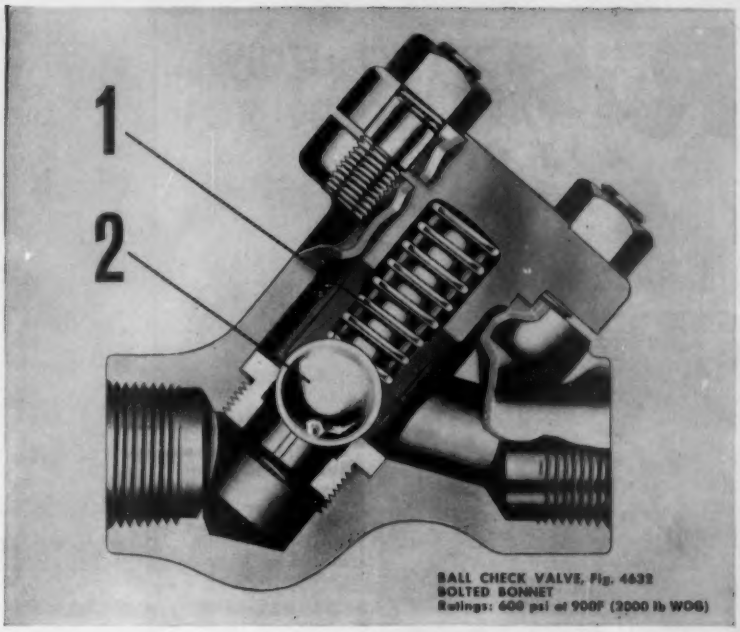
Morrow Pennsylvanian oil production was established in the Laverne gas area of Harper and Beaver counties in northwestern Oklahoma.

Cabot Carbon Co. 1 Cornell-State Unit, C SW NE 16-25n-25w, 4 miles south of Laverne, flowed 83 bbl. of oil in 8 hours on 16/64-in. choke, or 251 bbl. daily from perforations at 7,353-82 and 7,387-93 ft. The well is also a Hoover sand gas producer.

Texas Panhandle gets surprise oil well

The seventh well in a 10-well granite-headed program inside the old Panhandle field of the Texas Panhandle hit oil in the Permian white dolomite. This oil surprise is Cities Service Oil Co.'s 1 Burnett Ranch "E-100" in Section 100, Block 5, I&GN Survey, 6 miles southwest of Borger in northwestern Carson County.

The well pumped 121 bbl. of oil daily from perforations at 3,044-90 and 2,999-3,037 ft. It is 5 miles west of nearest oil pay in the gas-cap section of the county.



BALL CHECK VALVE, Fig. 4632
BOLTED BONNET
Ratings: 600 psi at 900F (2000 lb WOG)

You get longer valve life with...

Edward Check Valves for petroleum services

For the many petroleum services from oilfield to refinery where protection against flow reversal is required, Edward furnishes a complete line of forged steel check valves for horizontal or vertical installation.

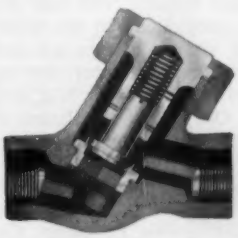
EDWARD BALL CHECK VALVES are specially designed to provide rugged, shock-free service where liquid or heavy viscous fluids are piped. The stainless steel spring (1 above) is sized and rated to give positive seating with heaviest of fluids. And the ball disk (2), made of EValloy 16% chromium stainless steel for tight seating, can be easily replaced when needed.

EDWARD PISTON CHECK VALVES also give freedom from shock or vibration, plus streamlined body design for full flow area and low pressure drop. Exclusive disk guide and spring loading allow for quick, positive seating.

LONG-LIFE FEATURES—Here are just a few design characteristics that make Edward check valves your best buy for petroleum services:

- your choice of screwed, socket welding or flanged ends
- rugged bodies of specially heat treated forged steel
- strong spring of stainless steel for sure closing action
- corrosion-proof stainless steel seats, and stainless steel piston disks or ball disks
- union, screwed, or bolted bonnet available

Edward builds a complete line of cast and forged steel valves for pressures to 10,000 lbs, with flanged, screwed, socket or butt welding ends. For additional information, see your favorite distributor, or write Edward Valves, Inc., 1212 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company.


PISTON CHECK VALVE, Fig. 3578
UNION BONNET
Ratings: 1500 psi at 850F (3600 lb WOG)

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another fine product by
ROCKWELL

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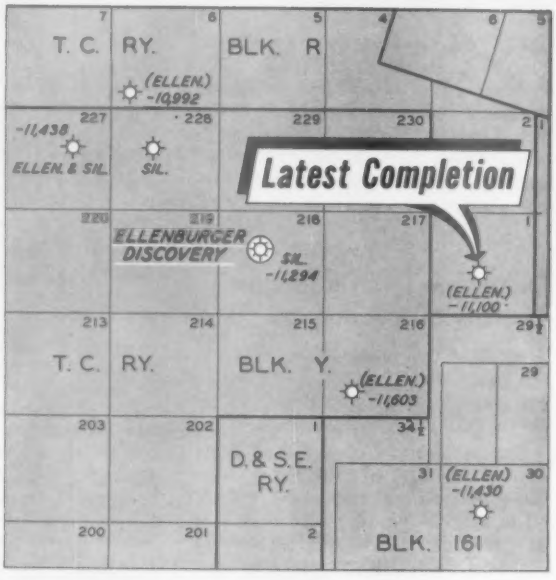
OSR-9

RANK wildcats and recent completions in Terrell County portion of Val Verde basin have been stimulated by . . .



DISCOVERY of big Ellenburger structure of Brown-Bassett field. Operators are cheered by news that . . .

Examiner okays pipeline plan

FOR THOSE who have invested heavily in shut-in wells in Texas' Brown-Bassett gas field, good news came last week in the form of a possible new outlet.

This Terrell County field also got its seventh completion. Of the seven wells drilled, six are Ellenburger and one is a Fusselman producer. One of those classed as Ellenburger is a dual completion. One of the six classed as Ellenburger wells was completed from both the Ellenburger and Fusselman.

The latest completion (1½ miles from nearest well on the field's southeast end) is Magnolia Petroleum Co. 2 Goode Estate. Structural position on the Ellenburger looked good, but its gas potential of 2 M.M.c.f.d. was considerably lower than other wells. Pay was open hole in the Ellenburger at 13,888-14,670 ft.

The new prospect for a field outlet at Brown-Bassett is Transwestern Pipeline Co., which has proposed to take gas from the Pecos-Terrell counties region of West Texas for transport to southern California markets. Last week an FPC examiner approved Transwestern's plan. The ruling now is subject to review by the commission. Contracts for delivering gas to

carriers out of Brown-Bassett field have not been let at this writing. El Paso Natural Gas Co. also has proposed to take the gas.

Field development . . . Operators at Brown-Bassett, and those who hold nearby acreage, still are confident of making it into a producing area of giant proportions.

One acreage holder, not yet a driller in the field, said the depths and possible long wait for a pipeline outlet made the whole thing too high-priced for his company, at present. Another said that when an outlet is obtained, drilling will provide the reserves that pipeline companies want to be assured of before laying that pipeline. It looks a bit like the story of the chicken and the egg, as to which one comes first.

More problems . . . As a new producing area off the beaten path, the field has its share of troubles. Like what to do with a gas that is more than half CO_2. El Paso Natural Gas Co. has a pilot-plant operation on one of Magnolia's leases, in an effort to combat the corrosion problem, and to handle the high CO_2 content. In comparison, Puckett field gas from the Ellenburger is only 28% CO_2.

Spurred deep exploration . . . Oper-

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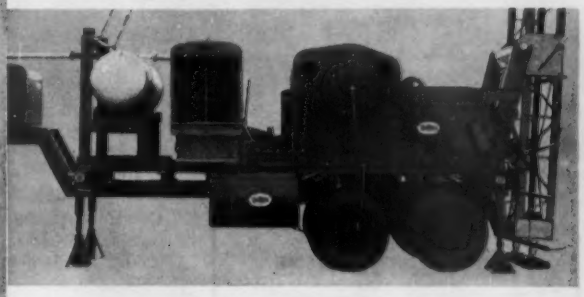

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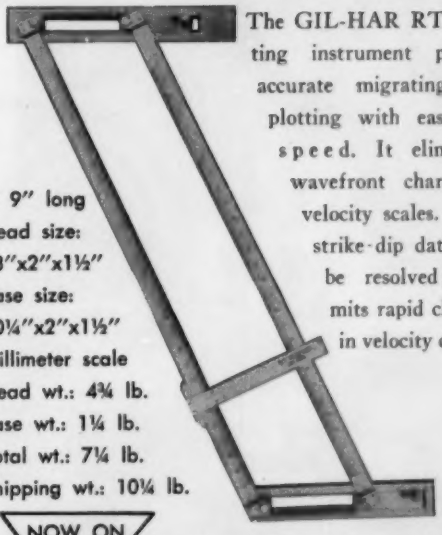

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13″x2″x1½″
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10¼″x2″x1½″
Millimeter scale
Head wt.: 4¾ lb.
Base wt.: 1¼ lb.
Total wt.: 7¼ lb.
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ators long have had big plans and hopes for new structures in Val Verde basin. So when Magnolia and Western Natural Gas Co. 1 Brown Bassett blew out from high-pressure Silurian gas, other companies who had done extensive seismic work in the area sat up and took notice. When the fire was brought under control and the well drilled ahead with a new rig, they also found 1,600 ft. of Ellenburger—and most of that showing gas.

Most successful of all the rank wildcats in Terrell County following the deep discoveries at Brown Bassett is Shell and Humble's 1 J. E. Smith in northern Terrell County, about 4½ miles southwest of Sheffield. This well was carried to 10,292 ft. before plugging back to 8,200 ft. At total depth it was in the Ellenburger.

The Smith well had good shows in the top of the Pennsylvanian, and light shows in the Devonian. Drillstem test in a Strawn section at 7,955-8,036 ft. recovered 1,800 ft. of oil, while tests of the Devonian around 8,560-8,795 ft. made gas flows up to 2,270 M.c.f.d.

On tests of the Pennsylvanian between 8,108-49 ft. the best flow was 132 bbl. of oil in 13 hr. through ¼-in. choke.

Shell and Humble 1 Smith is in Section 5, Block A-2, TCRR Survey.

Other active wildcats are: Pan American Petroleum Corp. 1 Ethel Corder, Section 30, Blk. 2, CCSD&RGNG Survey, in the northwest corner of the county. Total depth was 17,353 ft., plugged back to 14,700 ft. and shut in for orders. The well was in the Ellenburger at total depth, but the only top determined so far has been the Simpson at 14,770 ft. Elevation is 2,956 ft. No shows have been reported.

Gulf 1 Prosser, west of Brown Bassett, in Section 45, Block 1, TCRR Survey, had stuck drill pipe at 15,650 ft. No shows have been reported.

Gulf 1 Beulah McCue, Section 9, Block R-2, GC&SF Survey, 4½ miles northeast of Sanderson, was drilling below 12,520 ft. at last report. Projected depth is 14,200 ft. Operators reported slight gas shows around 10,-742 ft.

New test for northern Terrell County is Gulf 1 Allison Unit. Location is 16 miles north of Brown-Bassett field, in Section 17, Block B-2, CCSD&RGNG Survey. Projected depth is 11,500 ft. Drilling was below 1,082 ft. last week.

At this time the only drilling activity in the immediate Brown-Bassett area is Three States Natural Gas Co. 1 Banner Unit. The well's location in Section 23, Block 161, GC&SF Survey, is nearly 3 miles east of Magnolia's latest completion, but drilling reports carry it as a field-development test, scheduled to 14,600 ft. Operators were drilling below 5,530 ft. at last report. In view of other wells in the field that have been drilled from 1 to 1½ miles apart, still on structure, it may prove to be a "field" well.

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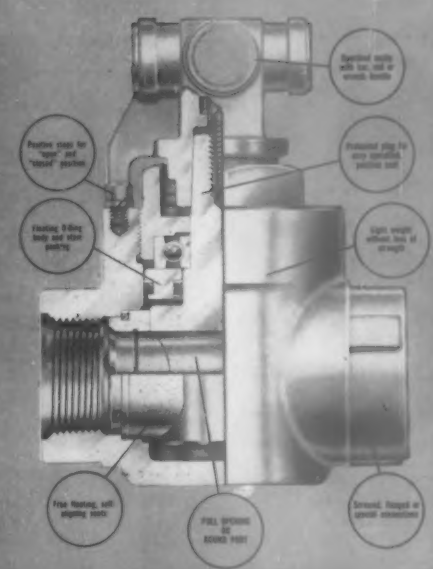

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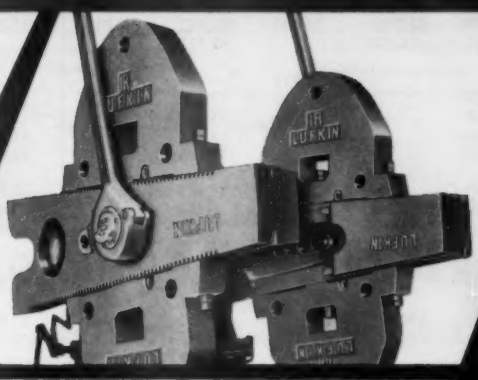
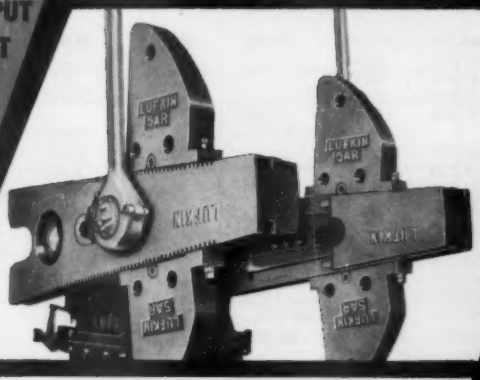


Larger counterweights for above average requirements. Increased thickness at end of crank for extra counterbalance.



Smaller counterweights are interchangeable on the same cranks for reduced counterbalance requirements.

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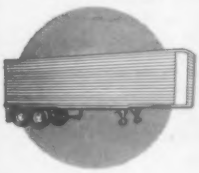
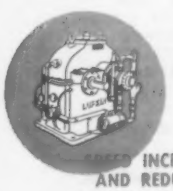
GAS ENGINES



TRAILERS



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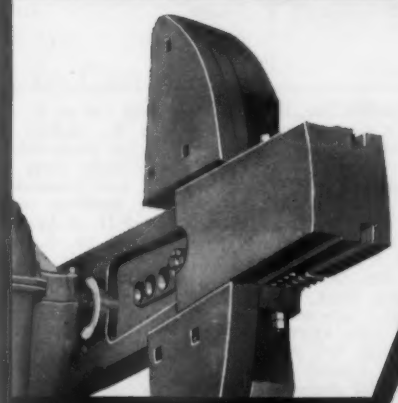

Extra space for thicker weights allows greater weight concentration at outer end of crank. Thick or thin auxiliary weights for greater counterbalance flexibility.

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June footage review for U. S.

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	23,059	.....	.....	.....	.....	.....	.....	.....	5,293
Arkansas	105,753	.....	3,835	65,702	.....	8,234	.....	.....	40,476
California	286,213	.....	17,754	90,948	10,676	.....	.....	4,522	138,388
Colorado	39,771	4,915	34,885	73,822	4,541	.....	.....	12,326	201,061
Illinois	197,232	.....	.....	104,540	21,770	21,579	.....	.....	25,621
Indiana	42,271	.....	863	50,628	4,404	3,512	.....	.....	49,760
Kansas	378,802	4,525	22,256	322,709	24,716	22,717	.....	16,646	213,308
Kentucky	197,824	.....	45,951	90,838	6,483	.....	.....	.....	20,342
Louisiana	970,640	252,095	69,557	633,549	3,010	23,853	12,788	.....	321,302
North	170,906	.....	54,057	108,845	.....	8,603	.....	.....	71,477
South	595,872	227,925	15,500	482,982	3,010	15,250	12,788	.....	238,325
Offshore	203,862	24,170	.....	41,722	.....	.....	.....	.....	11,500
Maryland	.....	.....	4,811	.....	.....	.....	.....	.....	.....
Michigan	45,700	.....	12,100	37,937	10,100	12,100	.....	4,893	41,307
Mississippi	135,248	.....	.....	73,653	.....	.....	.....	.....	265,720
Montana	89,780	.....	2,760	18,099	.....	13,035	.....	.....	42,015
Nebraska	137,120	.....	.....	154,206	.....	42,971	.....	.....	126,152
New Mexico	370,591	6,650	101,534	31,641	.....	20,846	9,283	17,730	88,505
West	78,860	6,650	94,932	6,465	.....	9,495	.....	7,244	17,743
East	291,731	.....	6,602	25,176	.....	11,351	9,283	10,486	70,762
New York	15,252	.....	.....	.....	9,320	.....	.....	.....	.....
North Dakota	187,804	.....	.....	84,558	.....	5,877	.....	.....	39,643
Ohio	88,435	.....	47,202	44,187	26,416	.....	.....	3,530	7,337
Oklahoma	749,749	138,474	244,637	453,272	17,463	23,888	24,503	13,524	302,054
Oregon	.....	.....	.....	.....	.....	.....	.....	.....	1,801
Pennsylvania	22,106	.....	127,452	9,674	6,250	.....	.....	8,474	.....
South Dakota	17,128	.....	.....	.....	.....	.....	.....	.....	.....
Texas	3,188,671	393,367	254,259	1,057,523	52,418	104,174	39,947	5,302	1,144,047
Dist. 1	92,625	.....	37,843	33,824	.....	.....	.....	.....	59,413
Dist. 2	62,512	82,612	42,676	70,537	.....	12,507	.....	5,302	140,969
Dist. 3	228,699	99,329	5,300	99,048	.....	.....	20,850	.....	116,552
Dist. 4	194,395	76,943	93,896	170,130	4,842	.....	.....	.....	136,247
East	174,032	38,096	.....	76,959	.....	2,644	7,613	.....	108,990
Dist. 7-B	243,975	.....	10,770	164,898	.....	22,013	6,003	.....	129,739
West	1,600,813	49,816	8,750	207,698	20,419	26,335	5,481	.....	289,816
Dist. 9	388,668	12,420	23,594	159,742	27,157	40,675	.....	.....	117,822
Dist. 10	202,963	34,151	31,430	74,687	.....	.....	.....	.....	44,499
Utah	74,994	.....	.....	11,958	.....	6,283	.....	2,950	15,315
Virginia	.....	.....	38,436	4,911	.....	.....	.....	.....	.....
West Virginia	16,262	.....	80,715	26,269	3,000	.....	.....	6,085	.....
Wyoming	198,482	.....	38,585	43,118	1,525	.....	.....	20,222	201,021
Total June	7,578,887	800,026	1,147,592	3,483,742	202,092	309,069	86,521	116,204	3,290,468
Western Canada	706,900	.....	92,116	62,647	.....	13,380	.....	4,000	126,158
Alberta	484,277	.....	81,313	46,326	.....	13,380	.....	4,000	86,316
Saskatchewan	218,419	.....	2,260	16,321	.....	.....	.....	.....	35,453
Manitoba	4,204	.....	.....	.....	.....	.....	.....	.....	.....
British Columbia	.....	.....	8,543	.....	.....	.....	.....	.....	4,389

Discovery wells

SOUTHWEST TEXAS

Dimmit County: Gulf Oil Corp. 1 Ruth McLean Bowman, Lot 55, Blk A, Hagelstein Farms, Blas Reyes Grant, A-4, 5 miles east of Carrizo Springs. IP 140 BOPD, 14/64-in., 34.4°, TP 628 psi., GOR 1,571 cu. ft. per barrel, perf. 5,804-22 ft. TD 8,667 ft. New-field discovery.

Duval County: Coastal States Gas Producing Co. 6 Duval County Ranch Co., Sec. 54, N. Hernandez Sur., A-1986. IPP 35 BOPD, 24.3°, perf. 1,733-51 ft., Hockley. TD 2,347 ft. New pay in North Government Wells field.

W. M. Laughlin 1 Natividad M. de los Santos, Share 7-A, La Huerta Grant, 2 miles northwest of Rio. AOF 3,500 M.c.f.d., shut-in TP 1,247 psi., perf. 3,268-74 ft., Frio. TD 3,379 ft. New-field discovery—2 miles southeast of La Huerta field.

Keystone Operating Co. and W. H. Doran, Jr., 2 Walter Herbst, Sec. 72, Andres Villareal Sur., 4 miles east of Freer. IPP 41 BOPD (net), 22% water, 23.2°, GOR 212 cu. ft. per barrel, perf. 2,824-26 ft., second Loma Novia sand. TD 2,839 ft. New-field discovery.

Hidalgo County: Tex-Star Oil & Gas Corp. and Blair & Vreeland 1 Alamo National Bank, Tract 7, Blk. 56, Citrus Fruit Development Land Subd., San Salvador Del Tule Grant, 1 mile southeast of Faysville. AOF 6,800 M.c.f.d., GLR 125 M.c.f. per barrel, 58°, shut-in TP 3,135 psi., perf. 8,086-95 ft., Frio. TD 9,021 ft. New-field discovery.

Jim Hogg County: Lawrence W. Hoover 1 Isidro Vela et al. Sec. 588, El Peyote Grant, 20 miles southwest of Hebronville. AOF 45 M.M.c.f.d., dry gas, shut-in TP 477 psi., perf. 1,913-18 ft., Hockley. TD 1,982 ft. New-field discovery.

Gorman-Gierhart-Howe 45 S. K. East, La Noria de Santo Domingo Grant, A-285, 16 miles south of Hebbronville. IP 105 BOPD, 11/64-in., 27°, TP 145 psi., GOR 150 cu. ft. per barrel, perf. 3,591-96 ft., Jackson. TD 3,725 ft. New pay in Prado field.

Jim Wells County: Hugo Allen et al. 1 Farmer, Los Presenos Grant, A-281, 3 miles southeast of Alice. IP 67 BOPD, P-37 choke, 33.8°, TP 300, GOR 1,790 cu. ft. per barrel, perf. 5,149-54 ft., Frio. TD 5,267 ft. New pay in Tom Graham field.

McMullen County: Texaco, Inc., 10 H. E. Gouger NCT-1, Sec. 64, Justo Corona Sur., A-1123, 11 miles northwest of Penitas. Shut-in gas well, no gage, perf. 2,766-72 ft., Jackson. TD 3,210 ft. New-field discovery.

Webb County: General Crude Oil Co. 1 Grant Adami, Sec. 339, BS&F Sur., A-872, 17 miles northwest of Freer. AOF 272 M.c.f.d., GLR 69 M.c.f. per barrel, 55°, shut-in TP 3,365 psi., perf. 7,408-13 ft., 7,417-22 ft., 7,431-36 ft., and 7,443-48 ft., Wilcox. TD 7,602 ft. New reservoir discovery in Adami area.

Barron Kidd 1 Luisa R. De Garcia,

June completion review

	TOTAL COMPLETIONS							WILDCAT WELLS							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	4	2	0	0	2	0	28,352	2	0	0	0	2	5,293	0	10
Arkansas	66	38	0	1	27	0	224,000	9	1	0	0	8	48,710	0	117
California	123	67	0	6	48	2	548,501	31	0	0	1	30	142,910	0	100
Colorado	75	8	1	7	58	1	371,321	46	0	0	2	44	213,387	0	101
Illinois	171	94	0	0	64	13	370,742	22	7	0	0	15	47,200	19	381
Indiana	98	29	0	1	66	2	151,438	33	3	0	0	30	53,272	85	91
Kansas	291	115	1	12	157	6	1,005,679	75	6	0	3	66	252,671	15	429
Kentucky	498	366	0	28	90	14	361,438	8	0	0	0	8	20,342	450	315
Louisiana	301	157	21	14	108	1	2,286,794	38	3	1	0	34	357,943	0	447
North	126	73	0	13	40	0	413,888	15	2	0	0	13	80,080	0	131
South	148	64	19	1	63	1	1,591,652	22	1	1	0	20	266,363	0	258
Offshore	27	20	2	0	5	0	281,254	1	0	0	0	1	11,500	0	58
Maryland	1	0	0	1	0	0	4,811	0	0	0	0	0	0	1	0
Michigan	66	21	0	3	39	3	164,137	12	2	0	1	9	58,300	19	191
Mississippi	52	14	0	0	38	0	474,621	28	0	0	0	28	265,720	0	61
Montana	33	18	0	1	14	0	165,689	12	2	0	0	10	55,050	3	61
Nebraska	75	29	0	0	46	0	460,449	28	7	0	0	21	169,123	0	81
New Mexico	157	106	2	26	23	0	646,780	25	4	1	2	18	136,364	58	265
West	73	42	1	24	6	0	221,389	7	2	0	1	4	34,482	16	141
East	84	64	1	2	17	0	425,391	18	2	1	1	14	101,882	42	124
New York	19	12	0	0	0	7	24,572	0	0	0	0	0	0	19	26
North Dakota	55	34	0	0	21	0	317,882	7	1	0	0	6	45,520	0	68
Ohio	80	31	0	18	22	9	217,107	4	0	0	1	3	10,867	80	201
Oklahoma	472	218	20	44	186	4	1,967,564	65	9	3	2	51	363,969	61	1,109
Oregon	1	0	0	0	1	0	1,801	1	0	0	0	1	1,801	1	0
Pennsylvania	50	12	0	30	3	5	173,956	1	0	0	1	0	8,474	45	46
South Dakota	2	2	0	0	0	0	17,128	0	0	0	0	0	0	0	5
Texas	1,459	835	51	53	501	19	6,239,708	259	20	5	1	233	1,293,470	102	1,150
Dist. 1	84	40	0	6	38	0	223,705	29	0	0	0	29	59,413	0	43
Dist. 2	66	13	10	9	34	0	417,115	24	2	0	1	21	158,778	0	56
Dist. 3	86	41	12	1	32	0	569,767	14	0	2	0	12	137,402	0	93
Dist. 4	136	47	10	19	59	1	676,453	26	0	0	0	26	136,247	5	85
East	82	44	6	0	32	0	408,334	21	1	1	0	19	119,247	1	51
Dist. 7-B	190	89	1	4	96	0	577,398	44	6	1	0	37	157,755	0	109
West	455	345	6	1	97	6	2,209,128	59	4	1	0	54	321,632	45	516
Dist. 9	275	165	2	4	92	12	770,078	36	7	0	0	29	158,497	51	111
Dist. 10	85	51	4	9	21	0	387,730	6	0	0	0	6	44,499	0	86
Utah	22	14	0	1	7	0	111,500	7	1	0	1	5	24,548	0	52
Virginia	11	0	0	10	1	0	43,347	0	0	0	0	0	0	11	0
West Virginia	52	8	0	31	12	1	132,331	1	0	0	1	0	6,085	50	189
Wyoming	101	42	0	10	47	2	502,953	37	0	0	3	34	221,243	2	178
June 1959	4,335	2,272	96	297	1,581	89	17,014,601	751	66	10	19	656	3,802,262	1,008	5,674
May 1959	4,016	2,069	80	310	1,441	116	16,090,173	692	71	9	12	600	3,220,128	734	5,468
First half 1959	24,367	12,399	602	1,773	8,972	621	100,588,709	4,517	450	63	135	3,869	22,280,004	4,486	.....
First half 1958	22,988	11,385	563	1,706	8,801	533	97,068,371	4,556	435	74	144	3,903	21,552,756	.....	.....

D.D. = 20: Okla. 14, Ohio 1, Ind. 2, Dist. 3 (1), Dist. 4 (2).

. . . and in Canada

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1959	Total	Oil	Gas	Dry	Footage	Cum. 1959
Western Canada	229	152	31	46	0	1,005,201	1,216	34	2	1	31	143,538	368
Alberta	152	93	28	31	0	715,612	706	23	2	1	20	103,696	197
Saskatchewan	72	57	1	14	0	272,453	436	10	0	0	10	35,453	120
Manitoba	2	2	0	0	0	4,204	19	0	0	0	0	0	5
British Columbia	3	0	2	1	0	12,932	51	1	0	0	1	4,389	42
N.W.T.	..	..	..	..	..	.....	4	..	..	..	..	.....	4

Sec. 710, Porfirio Garza Sur., A-2002, 12 miles north of Bruni. IPP 5.53 BOPD (net), 67% water, 23.9°, GOR 100 cu. ft. per barrel, perf. 1,395½-1,410½ ft., Frio. TD 3,010 ft. New-field discovery.

NORTH TEXAS

Archer County: Gulf Oil Corp. 1 J. R. Parkey, Jr. "C," W. Mayer Sur., A-272, 6 miles southeast of Dundee. IPP 132 BOPD, 43°, GOR 413:1, pay 4,948-58 ft. TD 5,695 ft., ground elevation 1,102 ft.

Young County: Carter-Gifford Oil Co. 1 M. K. Graham estate, Sec. 2400, TE&L Sur., 4½ miles north of Murray. IP 167 BOPD, 40°, GOR 600:1, Lower Caddo 4,113-42 ft. TD 4,618 ft., elevation 1,185 ft.

WEST CENTRAL TEXAS

Jones County: A. J. Frazier 3-C Dorsey, B. Buenis Sur. 197, 2 miles northwest of Hawley. IPP 60 BOPD, 40°, King sand 2,311-15 ft. TD 2,847 ft. Recompletion.

Parker County: Beacon Oil & Refining Co. 1-C Smith, J. M. Turner Sur., 3 miles northwest of Poolville. IP 49.6 BOPD, 15/64-in. choke, 45°, GOR 1,928:1, TP 130 psi., Strawn sand 2,773-75, 2,778-88 ft. TD 3,131 ft.

Frank M. Farley 1 Springfield Oil Unit 1, Sec. 47, T&P Sur., 16 miles northeast of Weatherford. IPP 1 BOPD, 38°, Strawn 2,810-30 ft. TD 2,916 ft.

Stonewall County: Perkins-Prothro Co. 1 Swenson, Sec. 147, Blk. 1, BBB&C Sur., 12 miles southeast of Aspermont. IP 108 BOPD, ¼-in. choke, 42°, GOR 453:1, TP 75 psi., Swastika 3,406 ft.

Frank L. Thompson
. . . practices what he preaches.

Oil Man Doubles as Mayor

- **Frank Thompson isn't satisfied with mere talk about oil men participating in local government. He shows the way.**

FRANK L. THOMPSON believes that oil and government do mix. For proof of this, you can take Thompson himself; he's not only the working vice president of a large, successful drilling-contracting firm, but he's also mayor of a thriving city.

Vice President Thompson spends most of each working day directing the affairs of A. W. Thompson, Inc., and keeping its 12 deep rotary rigs drilling profitably. Mayor Thompson spends a part of many days and a few of his evenings presiding over meetings of the Midland, Tex., city council and handling other city-government matters.

He must be doing both jobs well, for both company and city are considered to be well run and prospering. Not one to take credit from others, Thompson pays tribute to "the finest employes in the drilling business" and the "best city council anywhere" as the real reasons for any success of his company's drilling business or of his city administration.

When asked how he came to enter "politics," Thompson is quick to explain that Midland doesn't indulge in party politics on the city-government level. And, being mayor of Midland doesn't mean playing politics nor oiling party machinery, Thompson adds. It does mean, he says, trying to direct the city's work and expenditures to the greatest good.

"I made the race for mayor," Thompson says, "because I've always been interested in good city government. And, good government certainly does begin at home."

This interest isn't something he wants to keep to himself. "We've got the best administrative talent in the oil business right here in Midland," he claims. "If these people can't take an active part in our local government, then who can?"

With this in mind, Midland's oilman mayor has persuaded other local oil men to serve on city boards and commissions. "Now, when they come to city hall, they know what the municipal problems are and can make real contributions to solving them."

Thompson believes the larger oil companies should change their attitudes about employe participation in local government.

"For some reason, the oil companies have shied away from city government even though they have big investments in the welfare of the city," he says. "Now, some are becoming more interested and one or two even sanction their employes' holding public office. It's a healthy thing."

Life time in drilling . . . While Frank Thompson's background may be like that of a number of oil men, it bears little resemblance to that of most mayors.

He was born in Muskogee, Okla., in 1918 and was raised in the drilling business. Young Frank attended a series of schools throughout the southwest oil country and spent many of his summers working as a roughneck on drilling rigs.

After studying mechanical engineer-

▶▶▶ Personals

Douglas E. Edwards, intermediate petroleum engineer for Sinclair Oil & Gas Co. in Silsbee, Tex., has been promoted to senior petroleum engineer.

D. M. Haas and **H. M. Stewart,** engineering associates in the technical division of Humble Oil & Refining Co.'s Baytown, Tex., refinery, have retired. Haas has been on special assignment at Baytown as assistant process superintendent for several months. Stewart has been responsible for evaluating refinery power and steam needs and recommending additional generating capacity.

Edward F. Hensley has joined the operations department of Dow Chemical International, Ltd., S.A., as project manager of major foreign engineering and construction projects. A graduate of Purdue University, Hensley joined Dow in 1937. He has been project manager in charge of engineering, construction, and startup at Dow's Cleveland plant and at the Bombay, India, plant of an affiliate company.

William H. Heinlen, acting manager of international sales for B. F. Goodrich Chemical Co., has been appointed marketing manager for the international department.

Frank Floren, western division polymer supervisor for Enjay Co., Inc.,

ing at Texas A. & M. College, he entered the U. S. Army in 1941 as an infantry platoon leader. Later, during combat in the Philippine Islands, he was wounded in the right arm, leg, and side. The wounds cost him many months in hospitals and three fingers off his right hand.

When he was discharged as a first lieutenant in 1946, Thompson returned to West Texas to work with his father, A. W. (Tommy) Thompson, well-known drilling contractor.

Because of his wounds, Frank couldn't resume the usual ladder steps from roughneck to driller to tool pusher. So, he performed office duties and later acted as a scout. In 1952, he assumed his present post as vice president of the company and established his home in Midland.

No bed of roses . . . Thompson doesn't try to pretend that life in government is all easy.

In 1958 when he entered the mayor's race he was almost unknown outside the oil industry. Other oil men had sat in the Midland mayor's chair, but being an oil man was no guarantee of his election. The race was close, with Thompson winning by a nose and being installed for a 2-year term to end in April 1960.

Being in government is a "fabulous education," the new mayor has found. "Getting things done calls for a lot of diplomacy." He concedes that this isn't always the case in contract drilling, where diplomacy has often had to take a back seat to abrupt action.

With Thompson at the reins, Midland has been continuing an amazing growth (See related story on p. 102). It's annual budget is only slightly less than $4,600,000 and it is preparing to vote on a $5,255,000 bond issue to finance capital improvements. A new air terminal is just being completed.

"We can plan no more than 3 years ahead," he says. "Midland is growing so fast, we've done a good job if we've planned that 3 years well."

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has been named head of the company's new West Coast district office in Los Angeles. **Gene Huxley,** formerly Los Angeles polymer sales representative, has been named polymer sales supervisor for the Chicago district.

J. H. Davis, exploration manager for Continental Oil Co.'s CATC marine region, has been promoted to assistant manager of the headquarters geological section. He will continue to headquarter in Houston. Davis succeeds **G. H. Galny,** who recently was named Durango, Colo., division geologist. In other changes, **W. W. Cieply,** former assistant district superintendent in the Harvey, La., CATC district, has been named head of a new CATC marine district office in Morgan City, La. CATC group operations formerly were supervised through district offices in Harvey and Lake Charles, La. Others assigned to the Morgan City office are **A. C. Autrey,** formerly assistant drilling superintendent in the Harvey district, as drilling superintendent; **Glenn Shively,** senior production engineer in Harvey, as district engineer; **William K. Grittman,** geologist in Lake Charles, as district geologist; and **S. P. Moore,** formerly clerk in the Lake Charles district, as chief clerk.

William V. Montgomery, Jr., has been named Oil Hill, Kans., district engineer for Cities Service Oil Co. He succeeds **M. G. Main.**

Earle R. Freeman, who recently retired as a section head at Gulf Oil Corp.'s Philadelphia refinery technology laboratory, has opened consulting offices in Bryan, Tex.

Clyde E. Milligan, general counsel for the Kansas Corporation Commission, has resigned to join Colorado Oil & Gas Corp. as attorney in Denver.

J. W. Bartlett, vice president of Delhi-Taylor Oil Corp's special-projects division, will retire August 1. Bartlett was with American Liberty Oil Co. before joining Delhi-Taylor in 1949. He was elected vice president of engineering in 1950 and vice president, special projects, in 1957.

G. Wilbur Haynes, well-log analyst for Pan American Petroleum Corp. in Tulsa, has been transferred to Oklahoma City as exploration department well-log analyst there.

COPE

Dr. J. Q. Cope, assistant general manager of California Research Corp.'s Richmond, Calif., laboratory and manager of chemicals research, development, and technical service, has been elected vice president, chemical products and processes, for the company. **Dr. I. E. Levine,** assistant manager, has moved up to manager of chemicals research, development, and technical service at Richmond.

▶ ▶ ▶ Personals

Gilbert M. Andreen, formerly senior supervising engineer in the engineering and evaluation department of Core Laboratories, Inc., has joined Slick Secondary Recovery Corp., San Antonio, Tex., as vice president in charge of production and engineering. He will headquarter in San Antonio. A graduate of the University of Pittsburgh. Andreen was with Magnolia Petroleum Co. before joining Core Labs in 1955.

R. S. Buchanan, formerly district geologist in Liberal, Kans., for United Producing Co., Inc., has opened consulting offices in Liberal.

R. I. Maddox, Gulf Coast representative in Houston for California Research Corp., has been named group supervisor, geophysics development, in the company's La Habra, Calif., research laboratory. **P. M. Aagaard** will succeed Maddox in Houston.

F. R. (Mike) Saas, chief of the supply-demand section in the supply coordination division of Standard Oil Co. (Ohio), has been appointed to the staff of the president's office. Saas has been with Ohio Standard since 1945.

Clayton Glenn Price, formerly with Union Producing Co., has joined Petersen Exploration, Inc., Shreveport, La., as petroleum engineer.

Donald C. Simpson, resident engineer in New Orleans for Shell Pipe Line Co., has been transferred to Houston as engineer.

G. F. (Pete) Dana, geologist with Ohio Oil Co., has been transferred to Cody, Wyo., from Durango, Colo.

Donald M. Robinson, geologist with Shell Oil Co., has been transferred to Ely, Nev., from Bakersfield, Calif.

C. L. Towers, Jr., sales assistant to the vice president in charge of Shell Oil Co.'s East Coast marketing divisions, has been named general manager of Shell Co. (Puerto Rico), Ltd. **S. C. Burnet,** special assistant to the general manager of head office marketing departments for Shell, will succeed Towers.

Personals

REDLICH

G. Redlich has been named manager of economics and development for Polymer Corp., Ltd., Sarnia, Canada. Redlich will coordinate business development and planning with existing staff services. The post is a new one for the company. In other appointments, **D. J. Wormith** has been named manager, planning and development department, and **W. R. Carson** becomes manager, operations and analysis department.

Dr. Gregory Poloynis, Taft, Calif., was elected president of Blue Crown Petroleums, Ltd., at the annual meeting of shareholders in Calgary. Other directors elected were **Hamilton Anderson,** Vancouver; **Kevin Tuohy,** Los Angeles; **William Bentz** and **Achilles Poloynis,** both of Bakersfield, Calif.; **James Mizell** and **Thomas Moodie,** both of Taft.

William A. Dunlap, staff member at Dow Chemical Co.'s plastics technical service facilities in Freeport, Tex., has been promoted to manager of plastics technical service activities in the south. He succeeds **Robert W. Van Sickle,** who was recently named manager of the company's new polyethylene film plant in Findlay, Ohio.

Clifton C. Garvin, Jr., operating superintendent of Esso Standard Oil Co.'s Baton Rouge, La., refinery, has been appointed assistant general manager of the supply department for the company. He will headquarter in New York.

Gene Reid has been named executive vice president of Occidental Petroleum Corp. in charge of oil and gas production and development activities. Gene Reid Drilling, Inc., Bakersfield, Calif., has merged with Occidental but will continue to operate as a subsidiary.

Vernon Peppard, assistant regional geologist in Midland, Tex., for Monsanto Chemical Co.'s Lion Oil division, has resigned to open consulting geological offices in Midland.

A. Hove, chief engineer of Northern Ontario Natural Gas Co., Ltd., Toronto, has been named vice president and chief engineer. **E. C. Bovey,** assistant to the president, has also been elected a vice president.

Dr. Thery Fombona, former director of hydrocarbons in the Venezuelan ministry of mines and hydrocarbons, who joined Cia. Shell de Venezuela earlier this year, has been transferred to Shell International Petroleum Co. for a period of up to a year. He will step into an important position with CSV when he returns to Venezuela.

Louis Belinsky, district engineer in the San Antonio office of the Texas Railroad Commission since 1955, has been named deputy supervisor of the commission's District 1 office, San Antonio. He succeeds **L. J. (Dutch) Snyder,** who will retire August 1. Snyder has been supervisor of the District 1 office since it was established.

K. C. Vaughan, manager of the natural gasoline and gas department of Union Oil Co., has been elected president of California Natural Gasoline Association. He succeeds **H. J. Maxwell,** Standard Oil Co. of California. **J. A. Smith,** superintendent of gas and gasoline plants for Texaco, Inc., will be vice president and advisory committee chairman for the association, and **E. R. Millett, Jr.,** has been reappointed secretary-treasurer. Newly elected directors include **J. B. Armstrong,** California Standard; **D. R. Arnold,** Signal Oil & Gas Co.; **L. E. Clasen,** Richfield Oil Corp.; **Les Gfeller,** General Electric Co.; **F. H. Lacy, Jr.,** Honolulu Oil Corp.; **Milton Lewis,** Ralph M. Parsons Co.; **Harvey Menard,** Signal; **D. E. McFaddin,** Union; and **E. P. Valby,** Richfield.

VAUGHAN

Laurel G. Parkinson, general sales manager, chemicals, for Amoco Chemicals Corp., has been appointed general manager of marketing for the company.

Thomas M. Dailey, Jr., executive assistant to the president of Tidewater Oil Co., has been appointed manager, planning and personnel department. He will continue to headquarter in Los Angeles.

Norman Alpert, formerly with Texaco, Inc., has joined Esso Research & Engineering Co. as research chemist in Linden, N. J.

B. N. Russell, production engineer in Liberty, Tex., for Humble Oil & Refining Co., has been transferred to Baytown, Tex., as reservoir engineer.

SIMPSON

F. M. Simpson, executive vice president of Petroleum Chemicals, Inc., New Orleans, has been elected president of Cities Service Oil Co. (Pa.). He will headquarter in New York. The appointment is effective August 1. Simpson succeeds **Edward L. Stauffacher,** who was recently named vice president and a director of Cities Service Co., parent of Cities Service (Pa.). Petroleum Chemicals is jointly owned by Cities Service and Continental Oil Co.

Lewis Z. Carey and **Carl W. Ferris** have been named managers of the Pittsburgh and Philadelphia district offices of Du Pont Co.'s petroleum chemicals division. Carey, formerly manager of the Philadelphia district, succeeds the late Afton D. Puckett. Ferris was Chicago district manager for the petroleum chemicals division from 1956 to 1958. He recently has been assistant to the manager of the division's tetraethyl lead and planning section.

O. R. Elliott, Ohio Oil Co.'s Reed City, Mich., production superintendent, has been promoted to Michigan district superintendent. He will headquarter in Jackson, Mich. **M. L. Black,** formerly in West Branch, Mich., will succeed Elliott in Reed City. Others moving to the new Jackson office include **Robert Loose,** geologist, **J. A. Dellacca,** landman, and **F. R. Pinner,** engineer.

Ted Glass, Mount Vernon, Ill., consulting geologist, has been elected 1959-60 president of Illinois Geological Society. Other officers include **Walter K. Howard,** Olney consultant, vice president, and **C. B. Bauer,** Carter Oil Co., secretary-treasurer.

Joseph A. Keeling, who has just completed a year's management training with Seismograph Service Corp. in Tulsa, has been named manager of operations in Argentina for the company. He will headquarter in Buenos Aires. Keeling was supervisor of operations in Venezuela for SSC before joining Phillips Petroleum Co. as Venezuelan exploration manager in 1953. He rejoined SSC last year.

Don B. Winfrey, formerly chief geophysicist for Cities Service Petroleum, Inc., has joined Petty Geophysical Engineering Co. as assistant to the president. He will be in charge of geophysical operations for the company.

E. S. Murray, vice president and general superintendent of Tennessee Gas Transmission Co., has retired but will remain as a consultant to the company. Murray joined TGT in 1943. He was chief engineer before becoming vice president and general superintendent in 1955.

Henry H. Neel, exploration manager for Tidewater Oil Co., has been named manager of foreign exploration and production for the company. **T. G. Kelliher,** assistant southern division general manager in Houston

NEEL

KELLIHER

and former southern division exploration manager, will succeed Neel as exploration manager, domestic operations. Neel joined Tidewater in 1942. He was manager of foreign exploration for a short time in 1957 before being named exploration manager. Kelliher joined Tidewater in 1936.

Harold V. Turner, superintendent of maintenance at Cities Service Oil Co.'s Pampa, Tex., gasoline plant, has been promoted to superintendent of the Seminole, Tex., gasoline plant. **A. N. King,** formerly in Blackwell, Okla., will succeed Turner in Pampa.

Joe R. Howard, district superintendent in Abilene, Tex., for Texas Crude Oil Co., has been promoted to assistant division superintendent in Midland, Tex.

Wister H. Ligon, president and a director of Nashville Gas Co., has been nominated for president of American Gas Association. Election will be held at the association's annual meeting in Chicago. Other candidates are, for first vice president, **L. T. Potter,** Lone Star Gas Co., and, for second vice president, **E. H. Smoker,** United Gas Improvement Co.; **Vincent T. Miles,** Long Island Lighting Co., has been renominated for treasurer.

Thomas D. Nevitt has been named senior project chemist at the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.). **John W. Gorman** and **Maurice F. Oxenreiter** have been named senior project chemical engineers there. New project chemists are **Robert E. Higgins, William P. Hoogendonk,** and **Thornton P. Traise. Ernest Fruehauf** has been named project chemical engineer.

Foy H. Wade, formerly research chemist and assistant asphalt and lube-oil blend foreman at Ashland Oil & Refining Co.'s Catlettsburg, Ky., refinery, has been appointed sales engineer in the national accounts department. He will serve as technical advisor and sales representative on jet fuels and light petroleum products. He will headquarter in Ashland, Ky.

Neil J. Sheffield, formerly Orituapano district production superintendent for Venezuelan Atlantic Refining Co., has joined Placid Oil Co. as petroleum engineer in Houma, La.

J. N. Pedersen has been named drilling engineer for The California Co. in New Orleans. He will work primarily on special studies to improve drilling methods and procedures aimed at controlling drilling costs.

▶▶▶ Personals

F. W. (Ted) Heiser has been named manager of Colorado Oil & Gas Corp.'s new Mid-Continent region office in Denver. Operations of the Wichita and Liberal, Kans., and Denver district offices will be supervised by the new regional division. Heiser was formerly assistant manager of drilling and production for Colorado with headquarters in Denver. He has been with the company since 1954. **Hugh Wingerter,** formerly geologist at Liberal, has been transferred to Denver as regional exploration manager. The company also has regional offices in Calgary and Houston.

HEISER

Everett F. Stratton, vice president, operations, for Schlumberger Well Surveying Corp., has been promoted to executive vice president. **Charles K. Ruddick,** southeast area manager in New Orleans, will succeed Stratton as vice president in charge of operations. Both men have been with Schlumberger since 1936. Stratton had been operations vice president since 1956. Ruddick was Mid-Continent area manager in Tulsa before his appointment in New Orleans in 1955.

C. W. Daniel, senior exploitation engineer in Calgary for Shell Oil Co. of Canada, Ltd., has been appointed chief exploitation engineer for the company. Daniel succeeds **J. D. Savage,** who has been transferred to Midland, Tex.

▶▶▶ Deaths

Perce E. Allan, San Francisco, retired administrative vice president for marketing for Tidewater Oil Co., died July 12 at his country home near Clear Lake, Calif. Allan joined Associated Oil Co., predecessor of Tidewater, in 1915. He was western division sales manager and a vice president before being named vice president for world-wide marketing activities in 1954.

Hugo W. Wahlquist, 63, supervisor of corrosion control for Ebasco Services, Inc., died July 9 in a New York hospital. Wahlquist had been with Ebasco since 1942.

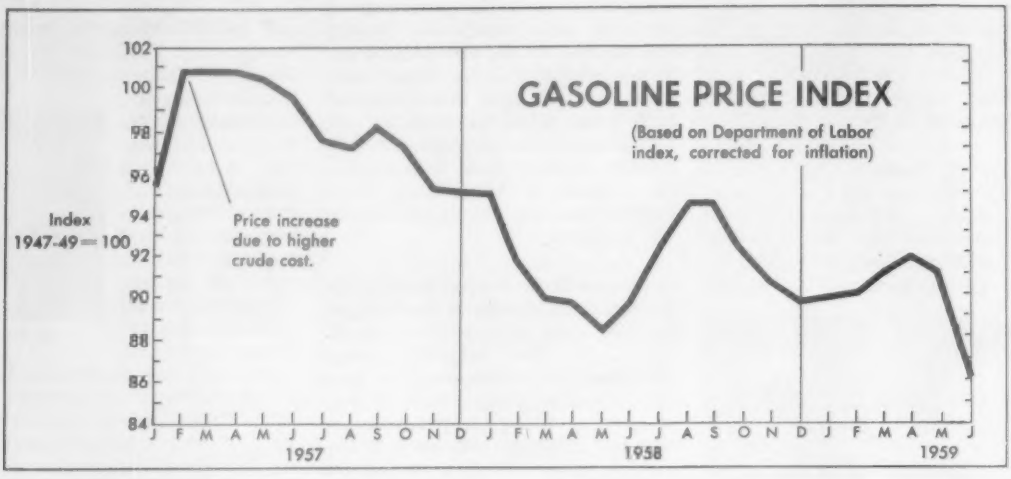
James A. Brooks, Jr., 55, geophysicist with Humble Oil & Refining Co., died July 19 in a Houston hospital. He had been with Humble 29 years.

M. S. Metz, 50, manager of exploration for Shell Oil Co.'s Houston area, died July 18 in a Santa Barbara, Calif., hotel after a heart attack. He was in California to attend a company geological meeting. A graduate of Texas A. & M. College, Metz joined Shell in 1937.

Frank W. Simms, 62, retired vice president of Buffalo Oil Co., Tulsa, now Buffalo Petroleum Corp., died July 16 at his home in Los Angeles after a heart attack. Simms retired from Buffalo in 1955 after suffering a heart attack. He reentered the oil business as an independent in Wichita in 1957.

William Grafton Morgan, 67, Pampa, Tex., drilling contractor, died July 21 in a Pampa hospital.

Elmo W. Boehl, 51, vice president of Tears Engineers, Dallas processing engineering firm, died July 11 in Dallas. He had been with the company since it was formed in 1951.



A few sales liven a dead market

BY JOHN C. CASPER

PETROLEUM-PRODUCT prices may depend as much on the "feel" of the market as on the actual statistical position of the industry at the time of the change. This is another way of saying that a few dump sales of gasoline can start a price skid that may kill many refinery profits for the season.

Also, if a few marketers have to make abnormal purchases of gasoline, the reaction will be toward firmer prices.

A general feeling of uneasiness about the gasoline market has been growing since early spring. Part of the change came through stock comparisons.

Stocks of most refined products were too high in the early months of 1958. The situation was bad enough to force a program of correction based on reduced refinery runs and a sharp cutback in crude production. The result was a record drop in refined-product stocks in the first 6 months of the year. The net reduction amounted to better than 40 million barrels.

Product stock reductions in the first quarter of this year were a little less than average and additions during the second quarter were above normal, but both suffered by comparison with the big cuts made in the first half of 1958.

The most disastrous effect of these comparisons showed up in gasoline markets. Gasoline stocks dropped 32.4 million barrels in the second quarter last year, the largest drop since the refinery strike in 1952. The reduction this year was about 23 million barrels, which was better than average but not enough to overcome the addition of 31.6 million barrels in the first quarter.

The end result has been gasoline stocks above last year since early in April. These net additions to gasoline stocks have helped establish this weak-market feeling which in turn has influenced gasoline prices.

The chart shows that average wholesale gasoline prices in June, expressed in true dollars, were the lowest of the past 3 years.

In recent weeks, refinery strikes have made it necessary for some marketers to buy gasoline. These sales were the turning point of this summer's gasoline market.

Gasoline stocks are dropping every week, but reductions are normal for the summer season. These stock withdrawals have not been large enough to produce a tight gasoline supply, but the shift has left a feeling of strength in most gasoline markets.

The big change is on the Gulf Coast. Spot cargo prices for gasoline have moved up a full cent a gallon in the past 4 weeks. The new price for 92-octane regular is 11.0 cents a gallon.

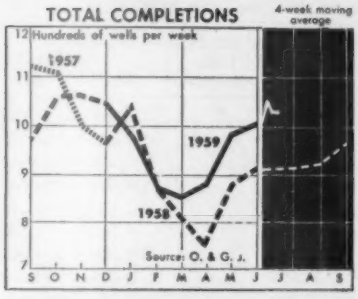
In the Group 3 area, refinery prices for gasoline dropped sharply in the second quarter. Unbranded jobbers could buy regular gasoline for less than 11.00 cents plus transportation.

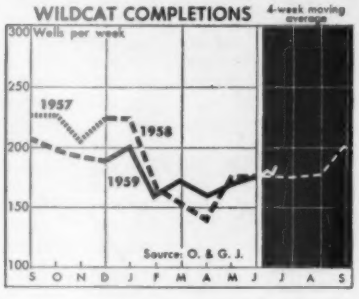
For the past week there has been a gradual shift in the tone of the Group 3 market, and tank-wagon prices are firming in many areas. The Group 3 price could be established at a higher level by the first of August.

There have been little more than normal reductions in gasoline stocks in recent weeks, but refinery purchases have added life to what appeared to be a stone-dead gasoline market.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,859,700	UP	57,375	UP	351,400
Crude stocks	270,288,000	DOWN	2,857,000	UP	18,568,000
Completions	1,015	UP	137	UP	160
Refinery runs	7,946,000	UP	110,000	UP	496,000
Gasoline stocks	189,859,000	DOWN	2,893,000	UP	10,303,000
Kerosine stocks	28,232,000	DOWN	262,000	UP	2,601,000
Distillate stocks	129,352,000	UP	3,534,000	UP	15,869,000
Residual stocks	54,269,000	DOWN	80,000	DOWN	12,930,000
Four-product stocks	401,712,000	UP	299,000	UP	15,843,000
Total imports	1,225,400	DOWN	172,700	DOWN	117,600





Active Rotary Rigs

	7-20-59	7-13-59	7-21-58
Alabama	9	8	6
Arkansas	16	17	14
Arizona	1	1	0
California	96	93	72
Land	91	88	(*)
Offshore	5	5	(*)
Colorado	50	51	58
Florida	1	1	1
Land	0	0	1
Offshore	1	1	1
Georgia	0	0	1
Illinois	41	41	40
Indiana	8	10	6
Iowa	2	2	3
Kansas	140	145	116
Kentucky	5	8	7
Louisiana	376	377	303
North	43	38	44
S. Inland waters	153	153	(†)
S. Land	121	130	215
Offshore	59	56	44
Maryland	0	0	0
Michigan	28	25	10
Mississippi	71	65	31
Missouri	1	1	1
Montana	24	26	16
Nebraska	24	23	23
Nevada	0	1	0
New Mexico	94	121	98
New York	1	1	2
North Dakota	28	23	32
Ohio	5	4	0
Oklahoma	247	245	199
Oregon	0	0	1
Pennsylvania	11	10	10
South Dakota	2	2	0
Texas	776	759	626
S. Inland waters	9	8	(†)
S. Land	191	199	128
Offshore	0	0	3
North-East	154	162	(*)
West Central	271	239	(*)
West	151	151	(*)
Utah	30	30	37
Washington	1	1	0
West Virginia	10	9	5
Wyoming	98	91	5
Total U. S.	2,196	2,191	1,772
Western Canada	157	141	157
Eastern Canada	0	0	2
Grand Total	2,353	2,332	1,931

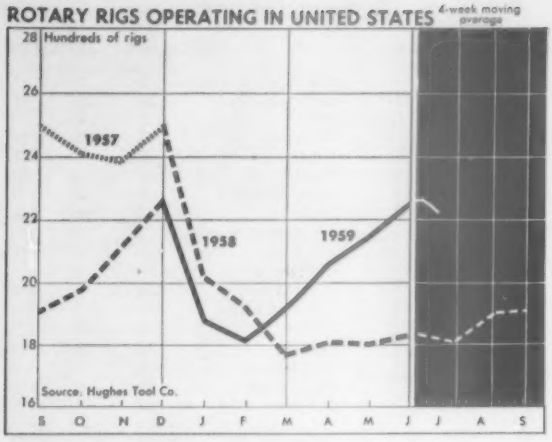
Hughes Tool Co. report. *Comparisons not available due to change in method of reporting. †Included in South-Land.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 18, 1959

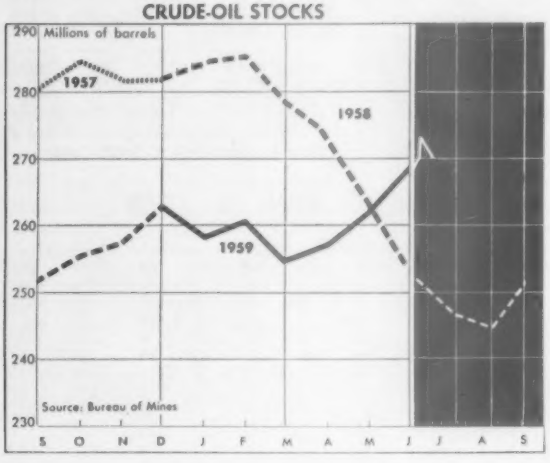
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	1	0	0	0	1	0	5,042	54	41	1	0	0	0	1	11	16
Arkansas	16	9	0	0	7	0	54,441	457	365	2	0	0	0	2	77	92
California	23	9	0	1	11	2	124,857	824	931	10	0	0	1	9	198	202
Colorado	22	6	0	1	15	0	109,345	396	415	9	0	0	0	9	232	232
Illinois	47	14	0	0	19	14	102,881	1,137	1,113	6	2	0	0	4	183	221
Indiana	23	10	0	0	13	0	31,639	431	399	5	0	0	0	5	143	147
Kansas	71	34	0	3	30	4	244,590	2,133	2,030	22	4	0	0	18	487	429
Kentucky	51	16	0	9	25	1	66,246	1,350	567	10	0	0	0	10	87	63
Louisiana	77	35	8	5	28	1	599,252	1,924	1,829	10	1	0	0	9	243	260
North	24	15	0	2	7	0	64,889	690	638	3	1	0	0	2	96	92
South	42	15	6	1	19	1	412,814	1,021	945	7	0	0	0	7	138	152
Offshore	11	5	2	2	2	0	121,549	213	246	0	0	0	0	0	9	16
Michigan	8	4	0	0	4	0	26,120	326	217	2	0	0	0	2	79	76
Mississippi	11	3	1	0	7	0	100,497	339	217	6	0	0	0	6	160	105
Montana	6	5	0	0	1	0	33,503	167	188	1	0	0	0	1	56	82
Nebraska	25	10	0	0	15	0	147,533	452	378	7	2	0	0	5	190	179
New Mexico	44	33	0	7	4	0	142,600	1,027	1,053	3	0	0	0	3	121	140
West	26	18	0	7	1	0	79,257	469	502	1	0	0	0	1	37	60
East	18	15	0	0	3	0	63,343	558	551	2	0	0	0	2	84	80
New York	0	0	0	0	0	0	0	149	315	0	0	0	0	0	13	32
North Dakota	18	12	0	0	6	0	120,945	283	237	5	2	0	0	3	57	81
Ohio	22	10	0	4	8	0	63,967	527	569	0	0	0	0	0	14	5
Oklahoma	109	52	3	14	39	1	436,026	3,212	3,555	14	2	1	1	10	467	498
Pennsylvania	0	0	0	0	0	0	0	311	310	0	0	0	0	0	5	9
Texas	392	208	15	11	147	11	1,538,845	10,413	9,819	83	5	1	0	77	1,930	2,031
District 1	31	19	0	0	12	0	56,737	630	545	5	0	0	0	5	172	223
District 2	13	1	3	0	9	0	96,067	434	419	5	0	0	0	5	125	109
District 3	29	10	4	1	14	0	227,984	625	722	7	1	0	0	6	130	156
District 4	40	15	5	2	18	0	194,707	711	669	7	0	0	0	7	173	192
East	37	29	1	0	7	0	77,257	621	670	5	1	1	0	3	124	192
District 7-B	45	19	0	0	25	1	141,067	1,450	1,296	13	1	0	0	12	386	366
West	100	58	0	0	35	7	435,107	3,217	2,876	29	1	0	0	28	422	405
District 9	68	35	0	4	26	3	173,816	1,984	1,935	12	1	0	0	11	338	329
District 10	29	22	2	4	1	0	136,103	741	687	0	0	0	0	0	60	59
Utah	3	1	0	0	2	0	19,199	177	225	0	0	0	0	0	48	43
West Virginia	24	1	0	17	6	0	51,826	406	376	1	0	0	1	0	11	11
Wyoming	20	6	0	1	9	4	101,098	493	384	6	0	0	0	6	168	109
Misc. (Mo., Nev.)	2	0	0	0	2	0	8,709	64	55	2	0	0	0	2	33	47
Total U. S.	1,015	478	27	73	399	38	4,129,161	27,052	25,589	205	18	2	3	182	5,013	5,110
Previous week	878	449	20	66	325	18	3,648,864	.....	.....	167	20	5	7	135	.....	.....
Cum. 1959	27,052	13,794	665	1,954	9,921	718	111,554,459	.....	.....	5,013	498	72	148	4,295	.....	.....
Cum. 1958	25,589	12,597	636	1,933	9,791	632	107,380,650	.....	.....	5,110	505	85	157	4,363	.....	.....
Western Canada	31	16	0	4	11	0	123,468	1,321	1,330	10	0	0	2	8	399	402
Ontario	13	3	0	3	7	0	16,273	123	.....	....	....	....	....	....	.....	.....

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

	7-11-59	7-4-59	7-12-58
Pennsylvania	2,472	2,488	2,913
Other Appalachian	2,026	2,082	1,348
Illinois, Indiana, Michigan	9,747	9,623	11,505
Nebraska and North Dakota	2,816	2,732	2,072
Kansas	10,262	10,197	9,560
Oklahoma	16,543	16,799	17,110
Arkansas	2,260	2,155	2,246
Louisiana	19,303	19,481	15,591
North	3,283	3,201	2,918
South	16,020	16,280	12,673
Mississippi, Alabama, Florida	2,528	2,604	2,091
New Mexico	7,956	8,333	7,010
Texas	117,185	117,309	103,124
East Texas	9,061	8,941	7,330
West Texas	56,994	56,333	48,477
Texas Gulf	19,475	18,986	20,615
Other Texas	31,655	33,049	26,702
Wyoming	15,475	15,800	14,946
Other Rocky Mountain	9,766	9,768	9,241
California	32,308	32,926	38,462
Foreign	†19,641	20,848	15,590
Total	270,288	273,145	252,809

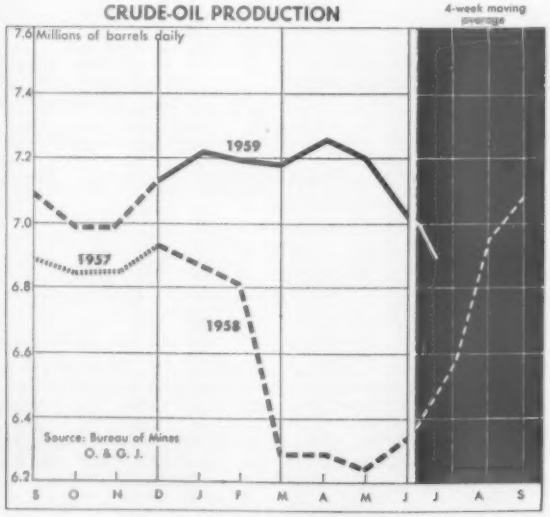
*Bureau of Mines. †Includes 4,985,000 bbl. in California.

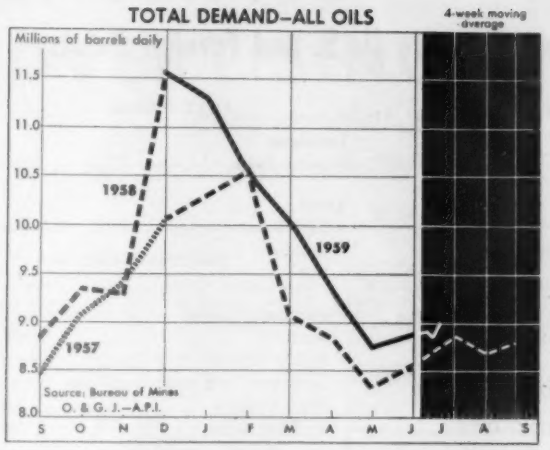
DAILY AVERAGE PRODUCTION FOR WEEK

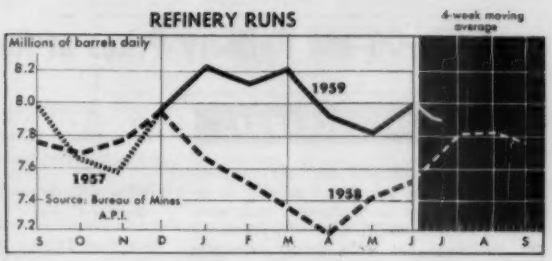
	July 18, 1959 Crude oil	Lease condensate	Total	July 11 total
Alabama	16,200	.....	16,200	16,150
Arkansas	80,750	275	81,025	81,350
California	850,400	.....	850,400	849,800
Colorado	124,800	.....	124,800	124,600
Eastern	41,800	.....	41,800	43,100
Florida	1,200	.....	1,200	1,200
Illinois	213,600	.....	213,600	217,000
Indiana	31,600	.....	31,600	31,400
Kansas	†322,740	.....	†322,740	†296,290
Kentucky	86,000	.....	86,000	86,500
Louisiana	882,500	98,400	980,900	981,550
North	110,000	4,900	114,900	115,550
South	772,500	93,500	866,000	866,000
Michigan	26,600	.....	26,600	26,500
Mississippi	127,500	4,275	131,775	131,775
Montana	79,300	.....	79,300	80,000
Nebraska	62,800	.....	62,800	62,500
Nevada	100	.....	100	100
New Mexico	288,000	3,800	291,800	291,800
North Dakota	37,900	.....	37,900	38,700
Oklahoma	†539,700	.....	†539,700	†507,500
Texas	2,407,000	71,675	2,478,675	2,478,675
Dist. 1	43,000	2,500	45,500	45,500
Dist. 2	98,000	7,900	105,900	105,900
Dist. 3	320,000	36,000	356,000	356,000
Dist. 4	167,000	8,500	175,500	175,500
Dist. 5	28,000	350	28,350	28,350
Dist. 6	101,000	6,500	107,500	107,500
East Texas field	128,000	.....	128,000	128,000
Dist. 7-B	128,000	100	128,100	128,100
Dist. 7-C	113,000	3,225	116,225	116,225
Dist. 8	970,000	3,800	973,800	973,800
Dist. 9	205,000	1,800	206,800	206,800
Dist. 10	106,000	1,000	107,000	107,000
Utah	115,500	.....	115,500	113,800
Wyoming	345,100	.....	345,100	341,800
Others	‡185	.....	‡185	‡235
Total U. S.	6,681,275	178,425	**6,859,700**	6,802,325
Change from prev. week up	.....	.....	**57,375**	.....
Canada	†512,700	.....	†512,700	†405,356
Total U. S. prod., Jan. 1-July 18				1,422,529,190 bbl.
Same period last year (crude plus cond.)				*1,287,729,520 bbl.

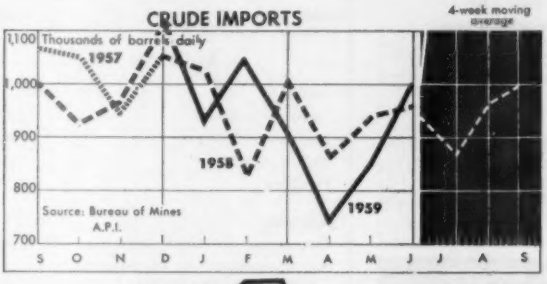
*Includes 32,375,320 bbl. condensate. †Week ended previous Monday. ‡Arizona, South Dakota, and Washington.

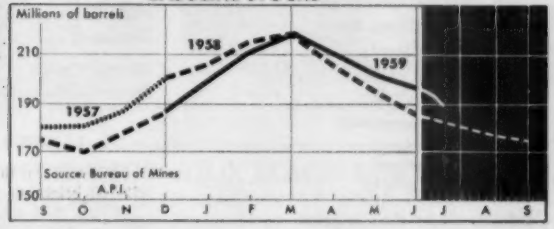
CRUDE-OIL PRODUCTION

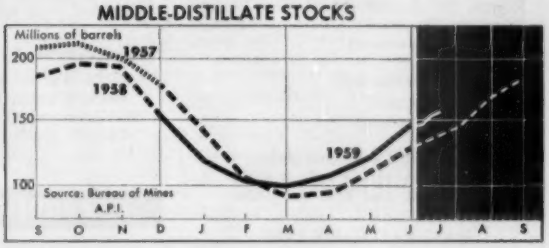


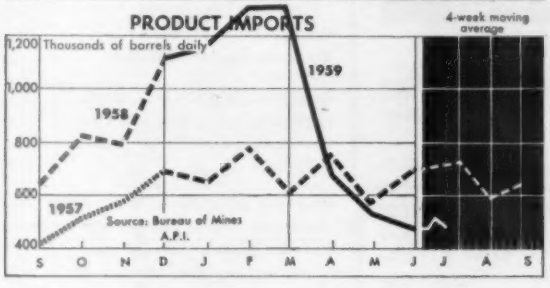


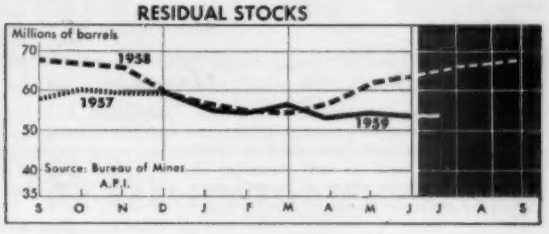












API REFINERY REPORT, JULY 17, 1959

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, July, 1958 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,109	535.5	12.1	323.0	184.9	45,697	10,611	45,331	12,418	1,093	497.9	20.1	285.4	171.9
Appalachian:														
District 1	88	42.4	3.9	22.4	5.0	5,448	574	3,113	277	94	42.2	2.5	21.6	5.8
District 2	111	61.3	5.0	21.9	11.0	2,759	538	1,223	140	108	55.4	5.7	17.3	7.3
Ind., Ill., Ky.	1,428	739.7	75.3	294.4	141.0	33,275	6,384	21,278	4,023	1,373	718.9	60.3	265.0	124.5
Minn., Wis., Dak.	115	56.4	3.7	26.6	12.0	6,246	994	5,464	405	109	53.0	5.7	28.4	10.0
Okla., Kans., Mo.	699	380.3	8.7	166.1	14.0	18,117	1,360	8,704	759	742	416.4	12.5	174.9	25.5
Inland Texas	353	256.6	12.0	58.3	30.0	7,096	404	1,925	2,094	272	192.9	5.3	45.3	18.2
Texas Gulf Coast	1,703	883.7	67.1	453.1	147.3	22,247	3,690	16,355	4,722	1,633	839.3	68.4	382.6	178.6
La. Gulf Coast	748	405.0	25.3	219.3	52.3	10,872	2,363	7,538	1,577	613	362.0	38.2	149.2	45.0
N. La. and Ark.	69	27.9	4.0	11.6	3.6	4,200	534	2,309	165	100	41.7	4.3	25.5	6.6
Rocky Mountain:														
New Mexico	25	12.0	0.3	5.1	3.0	738	45	187	109	27	13.5	0.5	5.1	2.5
Other	332	154.7	1.0	66.9	40.1	5,304	319	2,650	1,087	294	134.6	3.5	61.1	30.7
West Coast	1,166	504.4	9.9	145.7	293.4	27,860	416	13,275	26,493	1,069	485.6	5.6	150.0	284.8
July 17, 1959	7,946	4,059.9	228.3	1,814.4	937.6	189,859	28,232	129,352	54,269	7,527	3,853.4	232.6	1,611.4	911.4
July 10, 1959	7,836	4,062.0	234.9	1,636.7	923.7	192,752	28,494	125,818	54,349	.....	.....	.....	.....	.....
July 18, 1958	7,450	3,929.9	257.7	1,609.4	984.4	179,556	25,631	113,483	67,199	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

Regular (89 octane)	10.875-11.25
Premium (99 octane)	13.625-14.25

Gulf Coast (cargoes for coastwise or export movements):

★ Regular (90 octane)	10.75
★ Regular (92 octane)	11.00
★ Premium (98 octane)	12.125

California (rack) (Los Angeles):

Regular (88 octane)	12.50
Premium (94 octane)	13.50
Premium (100 octane)	15.00

Caribbean area (cargoes):

Regular (87 octane)	10.125
Premium (97 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:

Grade 26-70	4.5

Breckenridge:

Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

Kerosine 42-44	9.25-9.75
Diesel oil (58 d.i. and above)	9.00-9.50
Distillate No. 1	9.00-9.50
Distillate No. 2	8.25-8.75

Gulf Coast (cargoes):

Kerosine 41-43	8.50-8.625
Distillate No. 2	8.125-8.25

New York Harbor (barges):

★ Kerosine 41-43	9.65
★ Distillate No. 2	9.15
★ Diesel fuel, 48-52 d.i.	9.30

Caribbean area (cargoes):

Distillate No. 2	8.125-8.25

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank car	6.50

New York (export):

126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.85-2.00
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.27
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.15

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
★ 200 vis. neutral (180° at 100°), 25 p.t.	23

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	Gulf Coast Tex.*	West Tex.† N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17.17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.49	....	$2.35	2.06
21-21.9	2.50	2.52	....	2.38	2.11
22-22.9	2.60	2.55	....	2.41	2.16
23-23.9	2.69	2.58	$3.44	2.44	2.21
24-24.9	2.78	2.61	3.46	2.47	2.26
25-25.9	2.84	2.64	3.48	2.50	2.31
26-26.9	2.90	2.67	3.50	2.53	2.36
27-27.9	2.95	2.70	3.52	2.56	2.49
28-28.9	3.01	2.73	3.54	2.59	2.54
29-29.9	3.07	2.76	3.56	2.62	2.59
30-30.9	3.12	2.79	....	2.65	2.63
31-31.9	3.20	2.82	....	2.68	2.67
32-32.9	3.27	2.85	....	2.71	2.71
33-33.9	3.34	2.88	....	2.74	2.75
34-34.9	3.41	2.91	....	2.77	2.79
35-35.9	3.47	2.94	....	2.80	2.83
36-36.9	3.52	2.97	....	2.83	2.87
37-37.9	3.56	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 1-26-59; East of California, January 3-10, 1957; Pennsylvania Grade 4-1-59.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
★ East Texas	3.05-3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.25
Middle District	4.07
Southwest Pennsylvania	3.80
West Virginia	3.62
Buckeye Grade	3.47
Illinois Basin	3.00

FOREIGN

Canada:	
Leduc-Woodbend	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38
Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):	
Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.86
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05
Middle East, E. Mediterranean:	
Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.57

TANKER RATES PER LONG TON
(Latest reported spot fixtures)

★ Gulf-USNH, clean (ATRS—25%)	$2.14
★ Gulf-USNH, dirty (ATRS—30%)	2.00
★ Carib.-UK, clean (Scale—42.25%) 18s. 8d.	2.63
★ PG-Australia, dirty (Scale—62.5%) 19s. 1d.	2.67

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FOR SALE EQUIPMENT

1 SHAFFER TYPE 45, 10-¾" double gate blowout preventer; has one blank ram & one 4½" ram. $2,500.00, terms. F. H. Graves, Box 503, Ardmore, Okla., Phone 6337.

FOR SALE—One repressuring plant consisting of one Clark MA-8 compressor, three stage, 2000# discharge, 1,200 Mcf capacity. Skid mounted with scrubbers on first and second stage, also outside scrubbers. Cooling system for gas and propane storage tanks. This plant is complete and in first class mechanical condition, located in Throckmorton County, Texas. Contact Woodson Oil Company, telephone Hickman 9-2231, P. O. Box 232, Breckenridge, Texas.

1 BUCYRUS—ERIE 36L Spudder, late model. Rig complete with tools and equipment. Cassel Drilling Co. Inc., Dumas, Texas. Phone WE 5-5019 or WE 5-4369.

SINGLE POLE, reinforced 5" x 7", two-sheave 50' well servicing mast. Located Jennings, Oklahoma. A. Silberman, City National Bldg., Oklahoma City. CE 5-4356.

1958 FORD F-850 Truck—35,000 miles Oilfield Bed—64 Wench—and tandem float. Write: L. C. Smitherman Drilling Company, P. O. Box 627, Augusta, Kansas.

R. L. CARDWELL spudder, new in 1952, with GK Waukesha engine. A-1 condition. Priced right. Degen Pipe and Supply Co., Tulsa, Okla.

One 600 H.P. Climax V-125 12 cylinder engine and belt driven 2 stage Gardner-Denver gas compressor with shed—all unitized, glycol dehydration and gas cooling equipment and several thousand feet of 6", 4" and 3" pipe lines and complete control equipment to handle 1.75 M³cf gas per day at 800 psi from 40 psi. All in good condition. Reply P. O. Box 311, Hammond, Louisiana.

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Two portable 7,000 ft. Cardwell
Two portable 3,000 ft. Cardwell
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22,000' 5" OD USED P. E. R-2 J-55 14.87# SEAMLESS PIPE
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1—150 TON B.J. HOOK
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Bucyrus Erie 36-L skid mounted cable tool unit, complete with 4", 5½", and 6" tools.
Dog house truck mounted; rack, truck and trailer mounted. All equipment in excellent condition.
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or call HUdson 3-4474 or 3-4617.

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WELL DRILLS - CORE DRILLS. Everything for well and core drilling in both new and used equipment at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

GAS COMPRESSORS—Also small gasoline plant, pipe. Sell, lease, trade. Shut-in gas production wanted: Melvin W. Jackson, Meadows Bldg. Dallas.

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1500 FAILING DOUBLE drum on Chrysler. G-D pump on Ford mounted GMC, 28' Kelly $6250.00. Phone CIrcle 4-3408, Erie, Kansas. Earl Beeler.

OIL WELL FRACTURE AND CEMENTING TRUCK with pumps, etc. Sacrifice. Private Party. Dealers welcome. 1531 Kenneth Road, Glendale, Calif. CH 5-5017.

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Ideco H-35 HYDRAIR Used Single Drum Draw Works, Serial No. 130, with Twin Disc Torque Converter, Kelco Manually Operated Make-up Cathead, Kelco Air Operated Breakout Cathead, Parkersburg 15" Double Hydromatic Brake, Lebus Drum Grooving and Two-Engine, Oil Bath Chain Compound with 2" Washdown Pump and Air Compressor, powered by 2—Waukesha 6WAKU Engines, Serial Nos. 729297 and 730001. (This is a fine, modern hoisting unit powered for "stretching" capacity—located at Oklahoma City).

Waukesha 6LRZBU Used Engine with Standard Oilfield Engine Accessories, Heavy Oilfield Type Skid, Gasoline-Engine Starting, Butane Equipment, Fawick Clutch and 18" P.D. 15 D-Section V-Belt Sheave mounted between Roller Bearing Pillow Blocks. (Ideal for powering slush pump, having been used for that purpose with next item—located at Oklahoma City)

Unit Rig U-14 Used Heavy Duty H-Beam Master Skid with Demco Screw Jacks. (Has been used with slush pump unit consisting of 7¼ x 14 pump and above engine—located at Oklahoma City)

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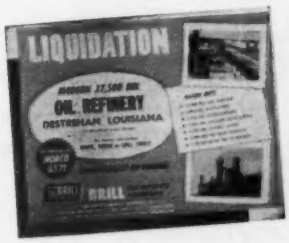

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BUCYRUS—ERIE, 36 L, good condition, 10" to 4" tools, steel dog house, 100 BBL steel water tank, 500 gallon butane tank. White truck with 30' tandem float. Many extra fishing and drilling tools. Priced to sell. Phone 591, Caney Kansas after six P.M. or DA 1-2368, El Dorado, Kans. P. O. Box 364, Caney, Kansas (R.L. Orr).

JOY MODEL 22 HD core drill mounted on Ford Truck. Long mast, drill pipe, excellent condition. Box L-427, The Oil and Gas Journal, Tulsa, Oklahoma.

BUTANE TANKS—4 8'x40' Horizontal Welded 16,000 gallons, Coded, Located West Texas. C. J. Smith, Oil Capital Building, LU 3-5516, Tulsa 3, Oklahoma.

TREATERS FOR LEASE with purchase option. Chief Equipment Corporation, 1715 York, Denver, Colorado.

1,500 FAILING HEAVY duty long mast, Kelly. 22 Bucyrus. 2⅜" and 2⅞" drill pipe. Fred Butler, Box 481 Pueblo, Colo.

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FOR SALE—133' IDECO Full View Portable Mast, 9' Substructure, Wilson Giant single drum drawworks, complete with two engine compound, Oilwell 20½" rotary table with torque converter, 7½ x 16 Bethlehem G-300 Pump. Excellent condition guaranteed. Kirkpatrick Oil Co., 1300 N. Broadway, Oklahoma City, Phone CE 9-1416.

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3 COMPLETE UNIT rigs for sale. U-15 drawworks. 2 Rigs are powered by 3 NKU Waukesha engines. 1 rig powered by 2 LRO Waukesha engines. Drill pipe and collars optional. Rigs may be seen at Henson Drilling Company yard in Abilene, Texas. Complete inventory on request.

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Major operator getting out of drilling business. Sell at Great Sacrifice Complete Drilling Rig:

1—23-9-REC Ideal Drawworks with National #50 Drive Unit Assembly.
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1—7½x15 Ideal C-250 Slush Pump.
1—8x20 Gardner Denver FH Slush Pump.
1—136' L. C. Moore Derrick with 30'x30' x9'3" Substructure.

Above complete with Rotary Table, Brantley Feed Control, Shale Shaker, Blowout Preventer, Swivel, Hook, Light Plant and other equipment. Complete inventory furnished upon request. For further information contact Box L-417, The Oil and Gas Journal, Tulsa, Okla.

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FOUR 2000 H.P. STEAM-DRIVEN COMPRESSORS

Four (4) Skinner Clark #SCRA-6 steam-driven double-acting compressors (Condensing).

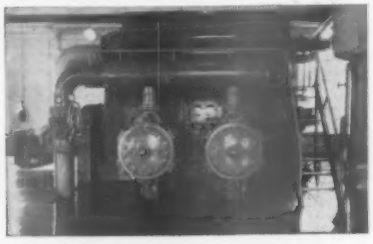
Each unit consists of six (6) Clark double-acting compressors with a total displacement of 6,360,000 cubic feet per 24 hours per unit. Each unit is built to the following specifications:

Bore.....14"	Class.....V.T.H.
Stroke.....14"	Maximum pressure. 400 pounds

Each unit is driven by a Skinner Universal Uniflow vertical condensing steam engine having the following specifications:

Bore.....18½"	R.P.M.....300
Stroke.....14"	Rated H.P.....2000

Each unit is equipped with complete condensing equipment. (These units can be seen operating.)



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One (1) Skinner Clark #SCRA-5 steam-driven double-acting compressor (Condensing).

Unit consists of five (5) Clark double-acting compressors with a total displacement of 8,320,000 cubic feet per 24-hour period. Unit is built to the following specifications:

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Stroke.....14"	

Unit is driven by a Skinner Universal Uniflow vertical condensing steam engine having the following specifications:

Bore.....18½"	R.P.M.....300
Stroke.....14"	Rated H.P.....1500

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- 6460 CFM CLARK Compressor 153 psia. 2000 HP. Motor
- 2—22,500 CFM I.R. Turbo Blowers 29.7 psia. 1700 HP. Turbine
- 2—C.P. Steam Driven Air Compressors 496 CFM @ 40 Psig.
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- 1500 Controlling, Indicating, Transmitting Instruments

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1958 MODEL 2000 Mayhew Drilling rig, on International tandem truck. 1959 Ford F-600 Tractor with float. Water truck. No Pipe. $32,500.00. Reply P. O. Box 755, Garland, Texas.

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Smls. Mill Tested 40' D.R.L. beveled line pipe for sale.
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Available for Immediate Shipment
100,000'—2⅜" O.D. x 3.57# USED LINE PIPE P.E. T&C
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15,000'—7" O.D. x 20# USED LAP WELD CASING 10 V, T&C
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—PIPE FOR SALE—
15,525 ft.—8⅝" OD x .277 Wall, 24.70# NEW Line Pipe, E.W., Prime Grade A.P.I. Spec. 5L-X52, P.E. Beveled, average 46 ft. lengths. Located: Kinder, La.
5,775 ft.—Same description as above. Located: New Orleans, La.
90,000 ft.—12¾" OD x .375 Wall, 49.56# Lapweld Used Line Pipe. Single and Double Random Lengths, cleaned, straight and beveled for welding. Suitable for lines or piling. Located: Manhattan, Ill.
56,000 ft.—20" OD x .375 Wall, 116.65#, E.W., Prime Grade 5L-X52, 52,000# min. yield, Used Line Pipe, Range 3, cleaned, P.E., beveled for welding. Just like new. Located: near Jonesboro, La.
10,000 ft.—6⅝" OD x .188 Wall, 12.89# Lapweld Line Pipe in Double Random Lengths with Midweld. Cleaned, straight, P.E. beveled for welding. Excellent grade. Located: Houston, Texas.
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U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 40 acres of land in one parcel within the known geologic structure of Canadian River Field, Jackson County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 2 p.m., M.S.T., September 18, 1959, when bids will be opened. Details of the lease offering, how and where to submit bids, and forms, may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver, Colorado. Dale R. Andrus, Land Office Manager.

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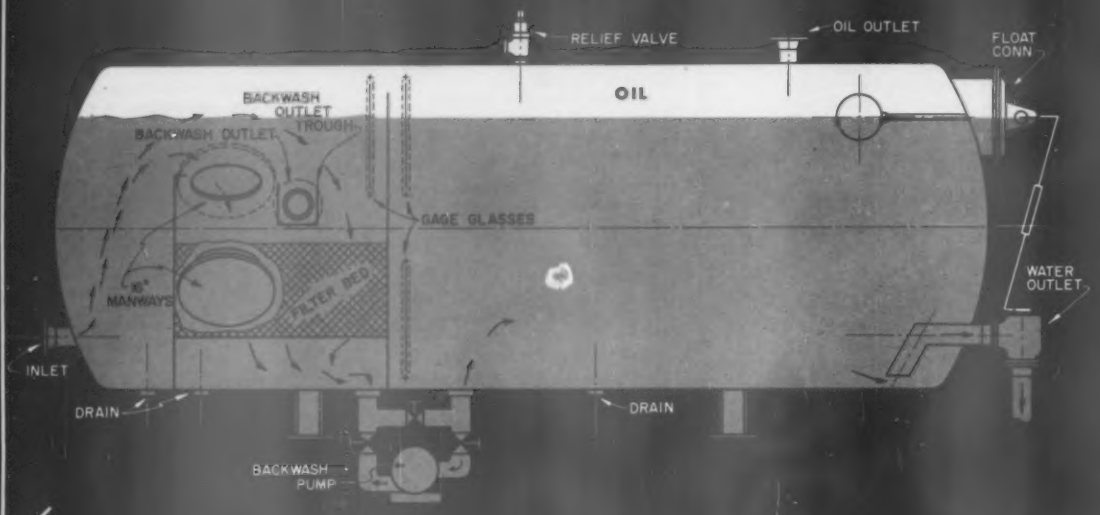

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